

PHILOSOPHICAL 9 B k
DIALOGUES

Concerning the Principles
OF
NATURAL BODIES:

WHEREIN

The Principles of the *Old* and
New Philosophy are stated, and the
New demonstrated, more agreeable
to Reason, from Mechanical Ex-
periments and its usefulness to the
benefit of Man-kind.

By *W. Simpson*. M. D. K

L O N D O N:

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TO


The most noble Prince,

GEORGE,

DUKE OF

BUCKINGHAM, &c.

My LORD,

 When I had writ this small *Philosophical Treatise*, I was casting about in my thoughts, whether this Infant needed a *Patron*, it was not (as I judg'd) so much) an *Embryo-Anchorite* or of such tender Age, but it might go abroad without hold; nor so much stricken in

A 2 years

The Epistle

years, as it had need of a Staff, in as much as *ipsa veritas suimet patrona est maxima* ; nor yet that it was arriv'd to that full strength as to need no support: Amidst which considerations my Lord, your Grace fraught with experimental Philosophy came in view; but I stopt awhile, pausing upon it, not daring at the first glance, to be so confident, till I had taken a better prospect of your personal candour to Ingenuity ; (which was not the least of those resplendent Gems that adorn the breast of Nobility) your encouragement to the improvements of Philosophy, grounded upon Mechanical Experiments ; your favouring that

Dedictory.

that for of Physick founded upon, and illustrated by the Noble Chymia, the Basis of a genuine Philosophical Hypothesis; and in particular your great condescension in familiar discourse concerning matters of this nature: All which, My Lord, duly weighed, has given me the boldness to take liberty of dedicating these my Labours (the first of their kind, I know off, yet extant) to your Grace: If worth the perusal, it's well: with what curiosities they will entertain you, let them speak for themselves. May these Philosophical Speculations shade themselves under your Tutelage, and take shelter under your suffrage,

A 3 shall

The Epistle, &c.

shall doubtless give them better lustre abroad, rendering them more acceptable to others, and give him an encouragement to a further concern, who is

My Lord,

Your Grace's

Most humble Servant

W. Simpson.



THE
PREFACE
TO THE
READER.

Candid Reader,

S Everal Sheets of which
this ensuing small tract
is compos'd, had laid by
me neer seven years,
whose Nativity might be Calculated
from that time I was so deeply inga-
ged with my quondam Antagonist,
Dr. Wittie, about Mineral Waters,
and particularly about the Mineral
or Spaw-waters of Yorkshire: For

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after

To the Reader.

after I had writ my Hydrolog. Chym. ere I had concluded the second part (being intituled Hydrolog. Essays, or a Vindication of the first) I fell upon some Philosophical Speculations, which when I had scatter'd in loose Papers, let them lye dormant, waiting a seasonable opportunity for the publishing thereof: And taking an occasion lately to review them, I corrected, altered, and added as I thought necessary, putting them into a dress, how suitable to the genius of this Critical Age, and how worthy to see Light, as it's not meet for me to say, so must refer to thy more serious consideration, and deep judgment to determine.

Perhaps thou mayst without much streining guess whom I mean by Hydrophilus personating the old Philosophy:

To the Reader.

losophy: if thou through any Analogy to the Peripatetick Philosophy, he in his Book vindicates, or through any likeness to his morose Sentiments and dogmatical Placets, or by any other similar Motives, shalt be drawn to conclude him to be the Person, I shall not gainsay; then may'st thou fix thy eye upon him, (no less like than a well drawn Coppy, to the Original) as the grand Champion of that Old Cause. or if thou approve not thereof, may by that name imagine any other person indifferently, speaking for, and arguing on the behalf of that lean and therefore hectically inclin'd, and well nigh expiring Philosophy, which will certainly dye of a Consumption, in Tract of time (as the other comes on, and grows vigorous,) wearing insensibly away.

In

To the Reader.

In this Treatise, as in a Land-
skip, mayst view such a draught (al-
though in Epitome) of the Principles
of natural Philosophy, as if drawn
to the Life, may generally and genu-
inely (without any force) represent
and solve (we think) natures Phæ-
nomena in the apparances of most
Bodies we meet with: In it may find
such a set of the Elements of natural
Bodies, as (if wound up to the height)
may conspire the procuring a Phi-
losophick harmony: Not to say here,
how teeming a womb our Principles
have, nor how they do quadrate (and
that perhaps more universally) with
Nature in her abstruce causes, nor
how consistent with themselves, nor
lastly how adapted to the regular mo-
tions of Nature, and accommodated
to the rendring intelligible Natures
model

To the Reader.

model in the Fabrick, Metastasis, and taking in pieces of Bodies, viz. in making Philosophick apparances more conspicuous to our understanding, but refer all our speculations to stand at the Bar of thy more mature (not I hope severe) judgment.

We have in this ensuing discourse, but sleightly touch'd upon our Principles, especially that seaven-fold complication of Fire, whose Principles are under one or other of the seven modifications, twisted or interwoven amongst most Bodies (especially Animals, Vegetables, and many Minerals) we converse with: yet may ex ungue leonem, measure the whole by the scantling: the further and ample discourse thereof, we refer to its proper place (viz.) to our Tentamen Physiologic. to which this is chiefly

To the Reader.

chiefly introductory: As to our *Halogia Chymica* being our discourse of Salts, and our *Lithologia Physica* concerning petrification, to both which we sometimes refer the Reader: our labours therein are at present only in Embrio, yet pretty forward towards the Birth, if at their full time shall be thought worthy to be borne, may ere long see light.

Seeing the field of Nature is very large, and many may be taking measures thereof by their several ways of Physico-metrical commensuration, and that every one has his liberty to survey her with the best instruments Mechanism will afford; and yet the Artists and all the Tools they can procure or invent, the former too short sighted, and the latter too few, to reach her profundity, to find out the qua-
dra-

To the Reader.

drature of her Circle, for to take the exact dimention of her Solids.

So that there is work enough for as many Geomitricians (I had almost said Pioneers) to Nature, as are adapted by long observation, and study for that work: And in my opinion all the late Physico-Metricians (if I may so call them) have in one sort or other done well; Thus Tachenius, Vander Beest, Beckerus, &c. have every one in their several capacities perform'd some service towards on improvement of Philosophy; not that I could, or would justify each of these in their several Hypotheses, but I think they have done this great piece of service, in that they have furnished us with many mechanical experiments, which although each in their way makes use of for building their

To the Reader.

their particular Hypothesis, yet we may well admit them as materials (viz.) Wood, Stone, &c. in order to a further and more rational Fabrick: but above all these, the noble and worthy Boyle has laid in so many materials, by his curious and manifold mechanical experiments and observations, as has thereby furnished the Checker of learning with a vast stock.

Hence its reasonable (I say) every one should have liberty not only in laying in materials, but also of venturing (if he have skill in building) to put them together, what freedom I have taken herein, is no more than what is in common to any other: And in short, whether I have us'd any skill in cementing together those notions I had grounded upon mechanical experiments, and what uniformity there is in the

To the Reader.

the Fabrick I have ventur'd on in this ensuing, and in other tracts already published, or yet to publish, (being room enough in the vast shop of Nature for as many as please to set up for themselves) is refer'd (gentle Reader) to thee to determine.

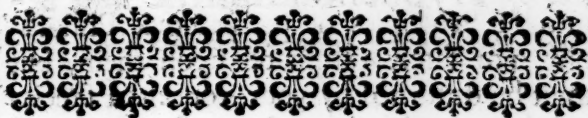
And wherein I fall short in this tract, (as being only an abstract of the Principles of Philosophy) I have endeavour'd to make up in my *Zymologia Physica*, or Philosophical discourse of Fermentation, (a noble subject and worthy the best of Pens,) to which occasionally I sometimes refer: also in my aforesaid pieces. If this find acceptance, I have thoughts also (*favente numine Divino*) to collect and digest some scatter'd notions, and at present immature speculations, I have about the abstruse Phænomena

To the Reader.

na of Hypochondraisme and occult qualities ; where the the true seat is of that grassant and afflicting malady; whence issues such varieties of sypmtoms, and what the Organs by which it's managed , with some considerations offer'd about the cure thereof , by other remedies than are through the ignorance of its causes) usually prescrib'd. Mean-while , if thou look favourably upon these present (although small) endeavours, may encourage him to a further task, who bids thee fare-well,

W. S.

L O N D O N,
April. the 10th. 1677.



PHILOSOPHICAL DIALOGUES.

SECT. I.

Pyrophilus.



Well met, *Hydrophilus*, what's the matter that your Countenance is so discompo'd? what is't that troubles you?

Hydrophilus. Troubles me, *Pyrophilus*? you know well enough, you need not ask the Question.

Pyroph. I may perhaps guess; but pray tell me what it is that sticks so on your stomach, as to cause such a cloudiness to over-cast the brightness of your natural features?

Hydroph. It is in plain terms, a company of your new Philosophers forsooth, that a

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man

man cannot sit quietly down with our old imbib'd Principles of peripatetick Philosophy, nor safely ruminate upon them, but must be disturbed by your conceited fancies indeed; we that have some of us spent so much time in the Colledges, and have taken a great deal of pains to be skill'd in the old Philosophy of *Aristotle*, and his followers, and you (a company of Punies) to amuse us, and (which is worse) the world, with your new Crotchets, like so many new-nothings; it was never a good world since such a young fry of Novel Philosophers peep'd up.

Pyroph. But why (*Hydroph.*) so wrath with the new Philosophers?

Hydroph. Would it not (*Pyroph.*) raise the spleen of any, even the calmest Dogmatists, to see you appear upon the Stage of the World, like so many *Americans*, presenting new and unheard of things, yea like so many innovators in Philosophy, every one bringing his Beads, Rattles, &c. I mean his new Notions, filling the ears of the people with your so much nois'd Mechanical Experiments forsooth.

Pyroph. Stay, why so passionate (*Hydroph.*) pray curb your choler, and discourse more calmly; there's no cause of such heat, if you weigh the matter well.

Hydroph. That's strange! how can a man
restrain

restrain from passion, while he observes a company of you innovators endeavour (if it were possible) to bereave a man of his beloved Notions, to rob him of his first conceiv'd Opinions, to tumble the Philosophical Orb up-side down, yea by ransacking and demolishing ours to establish your new Crincums.

Pyroph. But stay (good *Hydroph.*) be not so hasty, go not on so fast; let not the zeal for the old Philosophy hurry you too fast, nor drive you out of good nature.

Hydroph. I tell you (*Pyroph.*) I have much ado to bear it, I can scarce contain my self within bounds when I think on't: That we who have spent the most, yea the prime and flower of our years in sucking in the old Principles, should now of a sudden, through the introduction of your Whims, be look'd upon as triflers, yea be brought to this unhappy dilemma, either to reclaim our formerly taken-in Principles, or to run the hazard of the repute of old Peripateticks, which now begins to sound as badly in the ears of the World, as it doth in the ears of a woman to be called Old.

Pyroph. Pray (*Hydroph.*) compose your self a little, and be more calm; let not the headiness of passion over-rule you, but discourse the matter fairly and mildly.

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Hydroph. Mildly, (*Pyroph.*) how can that be? when we are so affronted and abus'd, that our esteem in the world seems past its *crisis*, and got upon the wrong side of the vertical point, deeply declining, and all through your so much admired Philosophical Stratagems: For I know not better how to denominate your mechanical Experiments than so many Stratagems, by which you seek cunningly to overturn and lay waste the walls of our good old Philosophy.

Pyroph. The affront (*Hydroph.*) is not so great, if you consider that from the aforesaid mechanical Experiments a new Hypothesis is, or may be rais'd, whereby you may approach nearer the knowledge of the truth (the great work of Philosophers.)

Hydroph. Truth? I tell you we were sufficiently satisfied before of the truth of our already established Hypothesis: and therein (although an inch broke no square with us) could solve the Phænomena well enough, at at least as much as we thought needful for us, who do not affect too much nicety in our speculations, nor to be too critical in our deductions.

Pyroph. Well (*Hydroph.*) but will not truth be more acceptable to you when the reasons of things shall be deduced from
more

more natural and genuine Principles, illustrated by mechanical Observations.

Hydroph. Mechanical Observations (said you *Pyroph?*) yea that's your *Diana*, you and the world of late so much admire: your *Bacon*, and your *Boyle*, or your *Bacon* well boil'd is so much in fashion with you, that scarce any other Dish (although never so good) prepared after an old fashion, will go down with you.

Pyroph. But withal (*Hydroph.*) you forgot to add a Calves head, which together make a savory Dish (usually going hand in hand) much in use in the Colledges, especially amongst the Seniors, those old sit-fasts.

Hydroph. Droll not (*Pyroph.*) for I am in good sad earnest, and cannot but tell you (even with a heavy heart) it's a hard case, that we must be compelled to turn School-boys again, and go with Satchels on our backs, to learn at your Pyrotechnical and Mechanical Schools, or else lye under the censure of every pitiful smatterer, that's lately crept out of the shell, and no sooner looks about him, but falls to Mechanism and Mechanical Philosophy forsooth, a thing never known, nor scarce thought of by our ancient Predecessors.

Pyroph. It's, I confess, a great tryal of your ingenuity, and demonstrates how much

(*Hydroph.*) you favour truth, although attainable after former disappointments, to quit the first Principles (although strongly impress'd) and to turn Volunteers to another more plausible cause, which yet is no more than the badge of an ingenuous temper.

Hydroph. What for us that are gray headed in the ancient sort of Philosophy, understanding every tittle of the *materia prima*, *forma substantialis*, *privatio*, all the affections of natural Bodys, internal and external, ἐντελέχεια, and quiddities of a thousand things more, familiar to us in our Philosophy, which we have all *ad unguem*; For us, I say (*Pyroph.*) to be constrain'd, to have all these impressions wip'd off, and so become so many *rasa tabula*'s susceptible of new impressions of another new (we know not what) sort of Physiology, would it not, think you, gaul any man to the inwards?

Pyroph. But if all those Notions by the induction of another, and more plausible Hypothesis be demonstrated (*Hydroph.*) to be no more than figments and *Utopian* Conjectures, shall not that (what ever it be) which is grounded upon an experimental Basis, be more satisfactory, and of more validity, than the other (you quote) which is founded upon airy Chimæra's and fanciful Dreams?

Hydroph.

Hydroph. I shall not dispute that (*Pyroph.*) only what you insinuate, That ours is built (like Castles in the Air) upon meer Chimæra's, remains for you to prove.

Pyroph. Which I shall indeavour to do (*Hydroph.*) for your satisfaction in the sequel of our Discourse.

Hydroph. Well, but if I must be the judge to determine the controverlie betwixt us, I should (*Pyroph.*) (once for all) for Antiquities sake, and indeed for our own too, (who have toil'd in that sort of Philosophy) give it clearly against you: for I must declare, I highly approve (and that for some reasons aforesaid) of the old sort of Philosophising.

Pyroph. You are it seems then (*Hydroph.*) a Philosopher of the old fashion, and therefore, no doubt, can readily give your suffrage on your own side: But if you bring not better, or more recent Arguments for the upholding thereof, that are yet more cogent than any we see hitherto, your old manner of Philosophising will be out of date, and you, ere long, will want Proselytes.

Hydroph. Why? if we can (*Pyroph.*) by an Hypothesis already erected satisfy ourselves, in the general, in the explicating of the causes of things, it's enough, we have what we aim at: For we would not (we

declare) be guilty of too much prying into the nature of things, lest we confound our thoughts, and at length lose our selves by too deep speculations into the reasons of things, contain'd in the vast Volume and intricate Labyrinth of the World.

Pyroph. True, (*Hydroph.*) the circuit of nature is of a large extent, many (not to say infinite) are the Meanders of that intricate Maze of things we converse with; one Century is not enough, nor a great many Philosophers sufficient to pry narrowly and well to search into, so as thoroughly to find out the vast depth of all the secrets of nature, or to investigate every Phenomenon of the Mundan Systeme, or rightly to know every *Encheirests*, and the Motion of every Wheel of the vast Machin of the World.

Hydroph. Why therefore, (*Pyroph.*) seeing nature is so intricate in all her works, and so curious in every texture of bodys (as you seem to insinuate) why, I say, should we be too solicitous about any one Hypothesis, so as out of an affected humour (some are more guilty of than others) to prefer that before another.

Pyroph. Because to me (*Hydroph.*) it seems rational that that Hypothesis (what ever it be) by which the Phænomena can more clearly and genuinely be solved, ought of right
to

to be preferr'd before the rest; for if I mistake not, to render any Hypothesis such, it is indispensably requisite that the principles concluded on, be of a competent number, teeming nature, perspicuous, and the most universal, well grounded upon Mechanical Experiments, and such whose deductions in the solution of the appearances of Nature, are to be (not rack'd but) natural and genuine.

Hydro. We are apt to think (*Pyroph!*) (if we may be judges in our own cause) ours to be such: it has moreover serv'd the world so many ages, being kept a foot by the Sages of every generation, till of late that some of you Upstarts have by your phanatick whims, grounded upon the canting mechanical experiments, won so much upon the world, as to give great jealousy ours is upon the verge of oblivion: and were it not that others (from whose judgment we are apt to measure our own demerits) were amuz'd with the new fancies, we could be content (for our own parts) to be by-standers to laugh at you, and to wait till we saw you weary of your own conceits.

Pyroph. But if I tell you (*Hydroph.*) that you are allowed, (no more than others,) to be competent judges in your own concerns; and therefore the controversie is fair-

ly to be scan'd and determin'd by indifferent persons. And as to the continuation of your Hypothesis for many centuries and its flourishing in the days of many learned men, that makes no more for the evincing the truth thereof, than because for many centuries of the world, the *Antipodes* was disbelieved, yea by learned men, for instance Saint *Austin*, *Lactantius*, and others, that opinion of the *Antipodes* was deemed to be a direct heresie; that therefore, I say, it was really so: Or, if any, though never so learned man, before *Columbus* his time, should have concluded that no such vast part of the world was really discoverable, as *America*, that vast, large and rich part of the habitable Orb, because from the same reason not then found out, which after so many centuries and so many fam'd Navigations was not known till the late discovery made by (the thereby fam'd) *Columbus*, that therefore such a conclusion, I say, should have been genuine: whereas indeed it would have savour'd so much of Antiquity, as to have prov'd very fatal to further invention, and contrary to what matter of fact might, yea did afterwards produce. And as to your being concern'd that others now, of late should be taken with our new Philosophy; we well know it toucheth you
to

to the quick, to be lessened in your reputation in the world.

Hydroph. Well, (*Pyroph.*) suppose I should with you conclude, that such an Hypothesis as you speak off were chiefly to be desired, and that ours was not such; yet we find you are not well agreed amongst yourselves in order to the establishing thereof.

Pyroph. That's not material (*Hydroph.*) For although several judicious and worthy men erect Hypotheses different from each other; and all cannot be thought to square with the genuine principles of nature, yea perhaps not one of them do coincide with the tenure and just method of nature, all (even the best) being reputed no other than Hypotheses; yet in as much as any Hypothesis is but a compendious System of Principles so laid or granted, as from whence genuine deductions and rational conclusions are to be made for the better and more clear understanding of the reason of things: Therefore what Hypothesis soever it be, whose principles are such and so laid as to approach nearest the character aforesaid; that without all doubt is by all ingenious persons to be preferr'd, till a better, (I mean such as comes nearer the mark and approacheth nearer the intent of nature) be found out, whereby the *Phænomena* may yet more clearly

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ly genuinely and universally be solv'd.

Hydroph. Why, what jangle is this (*Pyroph.*) you make about your new Hypotheses? are you displeas'd with the Philosophy of the Ancients, do you despise their inventions?

Pyroph. No, far be it from me (*Hydroph.*) to have too low thoughts of the learning and sagacity of the Ancients; surely we are very much beholden to them in many things; and were they now living in this our age would many of them be most accomplished in the improvements of the new discoveries in Philosophy and Physick, and therefore in their time are to be looked upon with a favourable aspect. But to set up our staff with a *ne plus ultra* amongst the Ancients, notwithstanding the late great improvements of ingenuity and advancement of learning in all sorts of Philosophical enquiries, is (if I mistake not) too much to indulge Antiquity, favours too much of affecting that which is old, and dints the appetite to a more plentiful Banquet of more recent rarities.

Hydroph. I tell you (*Pyroph.*) I am resolv'd (for ought I yet know) to stick to the Ancients back and edge, its their learning with which I have been train'd up.

Pyroph. True, *Hydroph.* you and I are
both

both beholden to them, you for their Precepts as the rule of your Philosophy and Physick, I for the same, as they are foysls to set off the beauty, and shades to give a lustre to the new experimental Philosophy, or as contraries to illustrate each other.

Hydroph. I must tell you (*Pyroph.*) that I look upon *Aristotle* and his followers or Commentators to be the chief, if not the only Dictators of the good old Philosophy.

Pyroph. And I must take leave to tell you (*Hydroph.*) that so much as *Aristotle* had of real solid knowledg, witness his History of Animals, which doubtless was acquired by a diligent and industrious Autopsie, so much the Modern Philosophers put a value upon him: But as to the whole Body of his Physicks, when I view his Theory of the Principles of natural Bodies, I cannot otherwise look upon them than as mere *entia rationis*, and in good earnest are merely figmental, viz. that which is not in *re-rum natura*.

SECT. II.

Hydroph. **W**Hy? are not (that we may speak to the purpose) his three intrinsic principles sufficient

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ent for the production of all natural Bodies (viz.) his *Materia, forma, ac privatio*? Is not his *Materia prima*, the first subject matter of all Bodies, as that out of which all natural bodies are not only made, but ultimately reducible into; and that which it self is without shape, yet capable of receiving all forms, of which it is always greedy.

Pyroph. Truly (*Hydroph.*) I know not what to make of his *materia prima*, yea think neither he, his Commentators, or you to boot, could ever tell how to render it intelligible: For the Peripateticks say, that it doth not subsist *per se*, but is only in *potentia*, and yet it is an *ens non actu tamen potentia*: Now (*Hydroph.*) that a constituent primary principle of all bodies should not be it self a body, is I confess a mystery to me indemonstrable.

Hydroph. What think you (*Pyroph.*) of his *forma substantialis*, which he defines λόγος τῆς οὐσίας, (viz.) that which determines the *materia prima in hoc aliquid*, as that by which the essence of the thing is introduced into matter, and from which every thing is denominated.

Pyroph. I have the same thoughts of it (*Hydroph.*) as I have of his *materia prima* (viz.) that they are both unintelligible, and, like an image, are nothing in the world.

Hydroph.

Hydroph. But what think you (*Pyroph.*) of his third Principle, Privation, which is the absence of the form in the subject matter, with an aptness of the matter to receive form.

Pyroph. I think (*Hydroph.*) (and see no solid grounds to the contrary) that it is as imaginary as the former : and that his whole ternary of Principles of natural bodys are to be reckoned at the best but amongst *entia rationis*, and therefore not at all to be reputed essential Principles of natural bodys, but in a true sence are merely precarious : Therefore the fam'd *Verulam* in his Tract *de sapientia veterum*, to this purpose hints, where he saith, *Opinio Peripatet. de stimulo materiæ per privationem fere non ultra verba tendit, & rem potius sonat quam signat.*

Hydroph. How do you (*Pyroph.*) look upon his external Principles of bodys, viz. the efficient and final.

Pyroph. Only (as I said before) *entia rationis*, mere reflections of an intellectual being, and therefore have no concurring influence upon Bodys as Principles.

Hydroph. But are there not (*Pyroph.*) (according to our Peripatetick Philosophy) certain affections of natural bodys, and those as the Philosopher distinguisheth either internal or external ; viz. motion and rest, finite.

finite and infinite, which are internal : place and time, external : are not these, I say, proper affections inherent and consequent to natural bodies as such ?

Pyroph. Before I give my thoughts thereof, I would know (*Hydroph.*) what he or you mean by those affections of matter, and first what is meant by that affection call'd Motion ?

Hydroph. It is, (*Pyroph.*) if I may speak in our own Language) an ἐντελέχεια, or the action of that which is in *potentia*, as such.

Pyroph. Surely that's a definition (*Hydroph.*) as difficultly to be understood, as to know what the *Ægyptian Osyris* was : or to unfold their Mystical Hieroglyphicks ; yea, and for ought I know, more dark than to unvail the Enigmatical Emblems of the Hermetick Philosophers : however more difficult (I think) than to know the natural causes of the flux and reflux of the Sea, and less obvious than to know the causes of the Inundation of the River *Nilus*.

Hydroph. But do not you think (*Pyroph.*) that motion is a proper affection of natural bodies, and that there are various species thereof, which are either conversant about a substance, or an accident : that of substance to be pertinent to motion, in order to generation and corruption ?

Pyroph.

Pyroph. Yes, as to the first (*Hydroph.*) I do look upon motion as the most proper and compatible affection of matter, in order to the fabric of all natural bodies: but as to the division of the species thereof, I confess I do not understand; for I judge motion to be a simple affection of matter, not divisible into species; and that amongst bodys, as such, there are to be found, no other motion than that we call local motion, which is the chief mechanical affection of matter.

Hydroph. That's strange (*Pyroph.*) how can that you call local Motion be of so large extent, as to comprise all the various species of motion to be found in our System of Philosophy, while it self is but reckoned amongst the sub-divisions of motion, taken in our general sense?

Pyroph. Its true (*Hydroph.*) it compriseth all the various species of motion, although in your Philosophy it be but found amongst those sub-divisions pertinent to accidents; where it comes lagging in the faggend of the discourse of motion, by *Aristotle* and his Commentators.

Hydroph. But doth not every loco-motion suppose a *terminus à quo*, and *ad quem*? Imagine then in the motion of bodys some to move only upon their own Axis (as no doubt

doubt some do) where then (*Pyroph.*) is your *loco-motion*, your *terminus à quo*, and *ad quem*?

Pyroph. I answer (*Hydroph.*) It's easily solvable by imagining any one point of that body moving upon its Axis, and the respect it has to any adjacent body, visible, or coucht in the Atmosphere, it no sooner can be thought to move or wheel about, but it loseth the former respect, and applies to another, whereby is really demonstrated a *loco-motion*, (*viz.*) a *terminus à quo*, and *ad quem*, the thing sought for.

Hydroph. But pray (*Pyroph.*) Is not generation and corruption a motion incompatible to *loco-motion*? Is not generation a motion or mutation, *à non esse ad esse*, by which a new substantial form is acquired, and corruption a motion or mutation *ab esse ad non esse*, whereby the same substantial form is lost, and that *generatio unius est corruptio alterius, ac vice versa*? Are not these perform'd by motion in a large sense, and yet I hope they are not reducible to that slight subdivision of motion, we call local motion?

Pyroph. I answer (*Hydroph.*) that I see nothing in that mutation of bodys one into another, which you call generation and corruption, but what is compatible only to *loco-motion*, guided by seminal.

or

or spermatic Principles in the Fabric of Vegetable and Animal Bodys, and by somewhat analogous thereto, even in the composition of all other mixts: and that those various changes amongst bodys one into another, ascribable to generation and corruption, are no other than the different Metastasis of the constituent Particles of bodys, or the various interweavings and complications of their intestine Principles; which whether shifting places in the same concretes give the different Phænomena incident to the same body, while its constituent parts and genuine ferments keep their natural tenure, method, and order, proper thereto, or else separating a portion of the most defecate parts, which contain an efflorescence of the whole, become by further and more gradual elaboration, spermatic Principles (being the whole reduc'd to an Epitome) congenial to what at first was set on work by the Primitive *Fiat*, for the upholding the creation by propagation, or similar productions.

In all which the main affection of matter is local-motion, where the parts in such size, shape and figure, by motion, guided by seminal Principles, with their congenit and peculiar collisions make up the texture, suppose of one body: The same parts being
dif-

differently acted by fire, ferments, salts, or solvents, separate themselves from their first texture that with the seminal beginnings compos'd the fabric of one body, now being guided by the other aforesaid active Principles or extrinsic Agents convene in another form which thereby give the appearance of another mixt body.

Only with this difference, that in bodys that are propagated by feminals or seedlings, the motion is guided by the seminal Principles and fermental Collisions connatural thereto. But in bodys that undergo a mutation one into another by the aforesaid active Principles of fire, ferments, salts and solvents, the motion is thereby guided according to the activity and ingagement thereof in bodys, whereby they are dispos'd differently, taken in pieces variously, and complicated in different forms from what they were before, whence they affect our senses with different qualifications of colour, shape, heat, cold, fluidness, permanency, &c. from what they did before.

Hydroph. Well, (*Pyroph.*) but me-thinks you should give us an instance whereby we might better understand your Theory by some practical example; for I can give you an instance, how we apprehend generation and corruption to be a motion, which yet we

we are not convinc'd is attributable to *loco-*
motion, and that thus:

We see that the flesh of an Ox corrupting
in the Air begets Bees, and that of a Horse;
Crabrones, Flies, where the corruption of
one thing (*viz.* the Ox his flesh) is the ge-
neration of another (*viz.* Bees) which cer-
tainly is a motion from that which was not
before to a new thing, and yet we know
not how you will solve this by local-mo-
tion.

Pyroph. Very well (*Hydroph.*) I was in-
deed about to have confirm'd what I said by
an instance, which is *in promptu*, but that
I was anticipated by yours, which I shall in-
deavour first to take off, and then shall pro-
pound mine: As to what you say therefore
concerning generation and corruption in your
example of Bees generated from the corrup-
tion of flesh of Oxen; *Crabornes*, Flies,
from Horse-flesh, &c. which you look upon
as a motion from a *non esse* to an *esse*, and
from an *esse* to a *non esse*: As to which terms
first I must tell you, *Hydroph.* that these are
only *entia rationis*, and therefore as such
have no influence at all upon matter in the
production of natural bodys, nor may be
reckoned as any species of motion.

But as to a true solution of the instance
which you propound (*Hydroph.*) *viz.* how
this

this change of bodies happens whereby they are (*Proteus*-like) transform'd out of one shape into another, may, I judg, be thus explicated (*viz.*) when the natural fermentations of the juyces of the body of the Ox, &c. (which while uniform and in their progressive and edifying motions, upheld by its natural balsam the flesh and other parts intire,) had ceased by the death of the animal, then the same ferments by a retrograde motion unravel their formerly wound-up clew, and for want of some imbalming saline particles, which chiefly consisted in the progressive motion of the ferments, a putrid fermentation begins, which by an analysis of the body takes it in pieces, and in its reduction *ad minima*, some acid and sulphureous parts combine with some seminal *effluvia*, and by a transposition of parts become animated into such or such a form, where, by the different *Metastasis* of the sulphureous and some fluid saline particles, directed in their loco-motion by some seminal emanations (lurking in the inward recesses of the body) they become together determin'd into such a peculiar shape of another texture and form from what it was before.

That the shape, figure, and form of these new products are determin'd either by seminal

minial effluvia, or by new ferments which conspiring with the fluid, saline and sulphureous parts in the analytical solution of the compage of the former body, make them combine into such a shape different from what it was before, might, I say, be demonstrated by many instances: the first is confirmed by the body of a Duck buried, from which (as *Kircher* observes) Toads may be ingendered, and that from some seminal parts of a Toad which lurk in the humours or flesh of a Duck nourished thereby, which by putrefaction are set a work and draw into consent some fluid saline and sulphureous parts resolv'd by the putredinous ferment and joyntly are determined into the form of a Toad.

Thus Worms are ingendered by a putred ferment in the blood and other constituent humours and flesh of animals, as also of the humane body: in so-much as *Shenkins* observes that Worms have been found even in the very heart: And *Pareus* tells us, they have been seen in the Liver, Lungs, Reins, and Bladder; yea the mass of blood undergoing any putrid resolution proves verminous. *Paracelsus* saith to the same purpose, *Regiones membrorum suos vermes noverunt, ita enim per anatomiam in cerebra repertus est vermiculus qui piam & duram matrem pertuderat,*
unde

24 Philosophical Dialogues.

unde phrenesis sollicitabat, tales per anatomia n etiam in corde reperti fuerunt, similiter in regione splenis fellisque vermes gigni possint: neither is there any putrid ulcer, *impetigo*, or *elephantiasis* which hath not his worms from a putridinous ferment: also in Cheese, Milk, Vinegar, and Horns expos'd to the Moon, in which by a Microscope Worms are discoverable: So that these spermatick *effluvia* joyning issue with some saline and sulphureous parts set at liberty by a putrid ferment in the analytical resolution (call'd corruption) or rather mutation or migration of bodies out of one form into another, produce variety of new products daily in the mundane System.

And what if I should tell you (*Hydroph.*) and make it good too that there is no Plant which in its putrefaction gives not some peculiar sort of Insect from an oviparous original: nor any perfect Animal (perfect I mean in *sua specie*) which doth not either immediately from the putridness of its body, or at least by putrefaction of its excrements, give some sort of animal Insect or other, witness that of *Lucretius*,

-----*Obnoxia cuncta putrori*

Corpora, putrores insecta animata sequuntur. which also is very evident even in the humane body, in which scarce any member
inward

inward or outward which is not subject to produce Worms.

And as the new Productions are most-what shap'd by the Motion and Manuduction of the Spermatic Principles with other parts set at liberty from the former Texture, which by new shuffling of parts constitute new Bodys, so also some alteration amongst Bodys are made (I mean in order to new Shapes) by the mediation of new Ferments, as for instance, that from brown Bread and Honey Ants should be produc'd; where from a mixture of those two a new Ferment should proceed, which becoming animated is determin'd into the form of an Ant: so from Honey and Dew that Eels should be ingendred, and so the rest of the like Productions.

Lastly, Other Mutations there are (*Hydroph.*) of Bodys out of one shape into another, which owe their original to either, or both of the aforesaid causes (*viz.*) to seminal Effluvia's, or new Ferments: of which sort are the production of Scorpions in the Brain of a Man, by frequent smelling at the Herb *Basil*, or from the fracedinous ferment of the same Herb betwixt two Stones, the same Animal may be produc'd, as both *Helmont* and *Kircher* observe: it's very probable this Plant may take its origi-

nal from some putredinous resolution of a Scorpion, as the *Satyrions* of divers sorts do from the Sperm of several Animals, which fermenting in the *leffas terre*, produce those Plants with those Signatures of the Genitals.

For (I must tell you *Hydroph.*) as there is scarce any Plant in whose putrid *Analysis* it gives not an Animal of one sort or other; so there are many Animals out of the putridness of whose spermatic parts fermenting with the nutritive Juyce of the Earth, Plants may be produc'd, of which sort are *Basil*, all the kinds of *Orchis*, *Satyrions*, *Mushrooms*, *Androsenum*, &c. yea, and from the like causes may many poisonous Plants take their original: For as the industrious *Kircher* observes, many or most of these Plants are found to grow in *morticinis cadaverum*, viz. where dead Carcases have been corrupted upon the Ground, or been buried in the Earth, in which places *Hemlock*, *Wolfsbane*, *Monksbead*, *Henbane*, *Assa fatida*, *wild Camomel*, &c. are most frequently found: where from the spermatic parts of putrid cadaverous Bodys, fermenting with the succulent parts of the Earth, or other Excrements, new shapes are assumed, either of other Animals, or Plants, according to the direction of seminal Effluvia, or specifical Ferments.

So that the *Metastasis* of those Bodys out of one shape into another, whereby they are very differently represented to our sensitive Organs (as that which was lately an Animal, may become a Plant, and that which was a Plant, may presently be changed into an Animal) may very well proceed (as I said) partly from the *loco-motion*, or transposition of seminal Principles, and partly from the awakening of new Ferments.

Thus you see (*Hydroph.*) how I have interwoven mine with your instances, and that the better to illustrate the manner of mutation of Bodys out of one form into another, whereby we may be able to solve the urgent *Phænomena* incident to Bodys in their *Metastasis*, or Transfiguration (if I may so call it) by the various extension of the parts of matter differently guided by seminal Principles, and specific Ferments, without having recourse at all to *Aristotle's Materia Prima*, his *Quaternary of Elements*, *substantial Forms*, or other general affections ascribable to natural Bodys according to the Theory of the Vulgar Peripatetick Philosophy.

Where I cannot but wonder why *Aristotle's* Commentators, should, where they treat of the general Affections of natural

Bodys, omit the Discourse of the four Elements, seeing they are, as they say, simple homogenial Bodys, from which all Concretes are compounded, into which they are ultimately resolv'd, and themselves irreducible into any thing before them, which therefore they esteem as the true Principles of all Bodys, and yet they are not according to their own account the *materia prima*: so that their *materia prima* is but at the best a thing in *potentia*, and that is only as much as to say, a nothing: Therefore it's left to the four Elements, to be according to your Doctrine, the true Principles of Bodys depending upon the *αὐγύαι* of Qualities, and yet, I say, they treat not of these till after they have done with the most general affections of Matter, which to me argues a large and indispenfible chink in the junctures of that old Philosophy you so much value.

SECT. III.

H*ydroph.* But seeing (*Pyroph.*) we are engag'd in a Discourse about the Principles of natural Bodys, and the general Affections thereto belonging, and that you deny our *materia prima*, substantial forms, and

and privation to be real Principles of natural Bodys, as also oppose Motion and its Species, with other general Affections of Matter, as they are laid down by our Philosophy, pray tell us how you apprehend the composition of Bodys to be, inlarge yourself, and render what you have already said somewhat more intelligible.

Pyroph. I have already (though in short) given you hints by several instances, how I apprehend the Mutation of Bodys out of one shape into another do happen. Now (*Hydro.*) I shall give you an abbreviate Account of my thoughts, how these (thus liable to mutation) are compos'd.

And that first by shewing you, that the Matter, Bodys (I mean such as are determin'd by one specifical shape or other) are made up of, is the same (as to the material and constitutive part of Concretes) with that which is in common to them, as considered in their *Metastasis* out of one form into another: and therein to shew, how it lies under a three-fold consideration, of so many general Affections: Next to shew what are those hidden Agents and mechanical Principles shut up in the seminaries of all such sort of Bodys, by which those general Affections, and essential qualifications of Matter, are exerted, and manuducted, in order

der not only to the Fabric, but pulling down, construction, but reduction of all such Bodys. Lastly: Instances to shew how all this is done by illustrating upon several remarkable *Phænomena* amongst Vegetables and Animals.

As to the first, How Matter as Matter is the common subject the *materia substrata* of all natural Bodys, which we else where shew to be Water, or such a texture of the parts of Matter, as sooner or later fall into that fluid body, we call Water, the parts whereof however rarified, or subtilized, as really water, I mean when condens'd, or collected, and seminal Masques taken off, as every spark of Fire, is Fire, concerning which we take occasion to enlarge in our *Tentamen Physiolog.* to which we refer you.

As to the general and essential affections of matter, in order to the structure of Bodys, the first is Motion, and that no other than *loco*-motion, or an intestine collision of the constituent parts: For without such motion neither would the parts of matter be inclinable to convene in any form for the texture of Bodys, nor would the texture of those Bodys already suppos'd to be in *rerum natura*, ever be changed out of one into another, which yet must necessarily be granted as long as things appear upon the wheel of vicissitudes

cistitudes on the stage of the World : all things, I say, would be at rest, and in a calm stilness, all the Springs, Wheels, Cords, and Pullies (to speak like a *Corpuscularian*) of automatus Productions, would be let down, disordered, broke, and out of joynt, if motion should cease, which therefore makes it an affection both general and essential to matter.

The next essential qualification of matter is divisibility: For if matter should be indivisible into minute parts, there could be no difference of Bodys, all would have the same shape, and the varieties we see of Bodys in the nursery of the World would not be: therefore matter must fall under our consideration as divisible into minute parts, yea, and of those many may be so small and indiscernable as may escape any perception by our senses, though never so acute or fortified by the best of artificial contrivances.

The third essential affection of matter is Extension: which is that whereby the concentrated parts of one parcel of matter, may be so enlarged as to fill a greater space, or to measure a larger Tract (by manifold) than it did before: For matter being set on work by motion, which in the fabric of bodys consists in an intestine collision, and

being divided thereby into minute parts, which combining in such or such a texture make up such a shape as is represented by one body or other: This again being sub-divided, or taken in pieces by some such active principles of matter, which we call Fire, Ferments, Salts or Solvents is thereby made capable of extending a larger space than it did before.

Thus matter (or water the original matrix of all concrete bodys) being moved, divided, and in a sort extended one part upon another by the manuduction of Seeds or Ferments towards the production, suppose of an Animal, Vegetable, or Mineral Concrete, which being determin'd into some peculiar shape (not jumping by an accidental and blind concourse of the mustering Atoms into spontaneous textures of bodys, according to the wild *Epicurean* Doctrine but) by the seminal Principles (call'd by the *Hermetic* Philosophers the innate Plastic Spirit.) This, I say, being further examin'd either by Fire, Ferments, Salts, or Solvents, becomes capable of being extended over a much larger space than before: so that extension of matter has relation both in order to the fabric of bodys as bodys, as also in order to the *Metastasis* thereof out of one shape into another.

Now

Now, I say, as matter in order to the texture of bodys has the essential affections of Motion, Divisibility and Extension; so we are to conceive of these parts divided under some shape, size, or figure, whereby they may the better convene in such postures as may by the manuduction of Seeds and Ferments make up the generality of mixt bodys in the World: with what figure so ever they be in their minutest parts physically divisible into, yet till they arrive at others by close combinations they fall not under our cognizance as principles of bodys, as we further declare in our *Tentamen Physiolog.*

Hydroph. But pray (*Pyroph.*) what are those Seminal Principles and Ferments (the next thing you propos'd to discourse of) which you call hidden Agents and mechanical Instruments shut up in the seminaries of all such bodys, to which you refer much of your Doctrine of Natural Bodys, chiefly in order to the Fabric of Vegetables and Animals, and by which you seem to differ from the Philosophy of the *Corpuscularians*?

Pyroph. Yes (*Hydroph.*) that I confess, for the better understanding the Basis of Natures works, in the establishing a well-grounded Hypothesis, we are rightly to consider, what is understood by seminal Principles, and Ferments.

By seminal Principles, therefore I mean the same with what I elsewhere (in my *Tentamen Physiolog.*) call *semina fecunda*, or Seeds, which I suppose (for none dare positively aver) are Minute Portions of the two Principles *Acid* and *Sulphur*, concentrated and wound upon a very small bottom, implanted and wrapt up by the parent of Nature in small raiments of matter, *ubi primæ cudentur rerum stamina*, which Principles in one are specifically differenc'd from what they are in another, whence the great variety in the textures of bodys of all Vegetables and Animals: which Principles are, I say, the organical Instruments and mechanical Agents included in all those bodys vulgarly call'd Seeds: wrapt up, I said, in small raiments of matter, not but that these Principles themselves are also material, and are at the long run reducible into Water, the material Principle of all Concretes, but with this difference, that they are pure subtle parts, (entangled in more gross) adapted for motion, or that collision we suppose indispensibly necessary in the Fabric of all such Bodys.

By Ferments here, we mean the fore-said Principles (being seminal sparks hidden in matter) which are (other requisites duly concurring) actually put into motion, or
set

set. into a natural and genuine collision.

These Principles in the progressive motion of their collision, yea, and in the whole round of their operation, (becoming thereby actual Ferments) give according to their various stades, the different *Phænomena* of the same body: so that all the apperances are measur'd forth according to the progress or regress of the aforesaid Principles. Thus Vegetation (as to Plants) is nothing else (as we else-where in our *Zymolog. Physic.* and *Tentamen* further say) but a slow pac'd motion or gentle collision of the aforesaid Principles, consisting in an intestin struggling thereof.

Thus for instance in the production of a Vegetable Seed-bearing Plant, as suppose of *Rosemary, Marjoram, Time, &c.* where we have nothing but the minute Seed with the intrinsic Principles, which are the con-nate plastic *Faber* seated in the Center thereof, and what it can determine matter into: Now when this Seed, being put into a due capacitated Matrix or Earth, begins, by the fructifying nitrous Salt in the Earth, or Air, or both, together with the concurrence of an ætherial matter, &c. (requisite to the setting all Vegetable Springs into motion) to open it self, the Principles or hidden mechanical Agents (or that seminal embryona-

tive spark, lock'd up in the visible Grain, or Seed) become an actual Ferment, whereby Matter, which is always mov'd at the beck of those implanted Principles, and is thereby sub-divided into minute parts, enters the Pores, and Streiners thereof, with such adaptation of Particles proportionable thereto, which becomes thereby extended, and is by the fore-said actual Ferment proper to that Seed, wrought into such a texture of parts, or specifical form singly peculiar to that Plant: where the shape, colour, sapour, odour, and other specifical endowments are determin'd by the seminal Principles, set into a fermental motion, and are the results of Matter formally extended thereby: For that a Plant should constantly (and more forcibly, during the time of the vigour of its natural Ferment) breath forth so strong an *aporrhæa*, or odour, as to be able to smite our senses therewith, as if 20, yea 100 could (as sometimes they may) stand within the Orb of its activity, might all be sensible thereof, is, I say, a demonstrable Argument of the extensibility of Matter and subtile Emanation of subtiliz'd or volatiz'd Parts, even in the Fabric of that Plant, carried off by the quick actions of the aforesaid Ferment; which is yet further discoverable, either by the reverse motion of the fore-said

said Principles of the Plant, whereby the same ferment in its Retrograde motion becomes putredinous, causing (in some Plants but especially in Animals) a fetidness, whereby also happens a *Metastasis* into an Insect (from causes aforesaid) or by force of fire into a fume of 100 yea 1000 fold larger compass than the body it self was, which fume although extending so large a space, is yet so gross as to make it self the object of our senses.

Thus you see (*Hydroph.*) how the same Principles, which lay dormant in the seed, (while in the Garner) where they are pois'd in *equilibrio*, and remain alone, so long incapable of fructifying or multiplying; how? I say, in order to the awakening these Principles and putting them into a fermental motion, there are some concurring requisites duly to be considered, *viz.* that it should be cast into a peculiar Soil or Ground, as its proper Matrix, which is the Matrix of the Husk, as the Husk is of the true Seed, where the *Leffas Terræ* (or juice of the Earth) being imbued with so much nitrous Salt as is sufficient, softens the Husk and makes it swell, whose compage being loos'd, the Air with its other (necessarily concurring to the exciting the Principles in every vegetable Production) getting entrance, awakes or
puts

puts the implanted *Embrio*-Principles into motion, thereby rendring them fermental; whence the noble Seed shut up in an obscure point, ariseth, whose mechanical Principles (necessary to the building all Bodies) are I say, call'd forth to act, break the Prison-doors, and in their mutual wrestlings, cause that grand *Phænomenon* of Nature, we call Vegetation, where Water by the manuduction of Seeds or seminal Principles becomes determined into fibrous off-shoots, & those being hollow, carry along more of the succulent juyces, which as it flows in those Pipes, upon its access, more Fibers, Sap-vessels, and others, (whether as Veins, Arteries, &c. analogous to Animals, we refer to the particular disquisitions of the worthy *Malpighius*, & our Countryman *Dr. Grew*) are produced; while the formerly made Vessels by access of Air (or being long expos'd thereto) become condensed or hardned into stalks, wood, &c. and so is wrought on, by the weavings of the foresaid seminal Principles, till the whole Plant or Tree put on its intire form of Root, Stalk, Bole, Bark, Branch, Fruit, or Flower.

Besides which weavings, coagulations, and condensations of water into vegetable concretions from causes aforesaid, its more-over if I mistake not (*Hydroph.*) as easie (and

as daily perform'd) for Nature from the power of seminal ferments set a work in Vegetation, and after continued by allowing due requisites or ferments congenial, to turn I say, Water into Wine, as it is for the same, by the winding off of those ferments in a natural circulation to reduce Wine into Water, both equally and daily perform'd by the same seminal Principles differently and in their circular motion considered; yea, and to turn also Water into all manner of potable or fermentable liquors by the mediation of the foresaid Principles, once broke off from Vegetation, and kept afoot by the melting of the Grain, then dissolved in Water, and after by a ferment connatural set into a fermentative motion, as it is for the same potable Liquors at the long run of their ferments (insensibly winding off) to be reduc'd into Water again, and so on in a constant round of action and circulation of motion in the upholding the great vicissitude and interchange of things.

So that these Principles in their gentle collisions are not only the cause of Vegetation in all manner of Plants and Trees, and the various appearances thereto belonging, both of generation and corruption, weavings and unweavings of Bodies by the winding on and off, of the Principles; but also put into new
and.

and different collisions or higher fermentations become the Patrons of all potable Liquors, and yet higher become the efficient of heat, and that either remiss or intense, yea so intense as to break forth into actual Flames, and so by such rapid fermentations exhibit the *Phænomena* of fire and light not only compatible to Vegetables, but also to Animals, and all sulphureous Minerals, as we farther discourse in our *Zymologia Physica* and *Tentamen Physiologic.*

And further, how from the twistings and evolutions of the same Principles, how I say the most obvious *Phænomena*, are thence solv'd; for instance, how colours, those *ludicra sulphuris*, the sportings of vegetable Sulphurs, from whose intertexture and coagulations upon their genuine Acids are produced such different textures in Vegetables, as from thence are struck those amiable colours our Opticks are so pleasantly accosted with: How saviours of Plants are the results of vegetable fermentations in order to an equal temperature, to and from which as they approach or recede, they become pleasant or ungrateful, whose gratefulness (especially of fruits) depend upon their approximations to maturity, where their Acids are sweetened by the maturity of their Sulphurs upon the wheel of Vegetation; How odours of

Vegg-

Vegetables are but the efflorescence of their Sulphurs or subtile emanations emerging from intestine vegetative fermentation, where from the continual hits and unwearied touches of the native Acid upon its Sulphur, the Sulphur becomes so subtilized as to wheel off in a sensible *Apporrhœa*: How also the medicinal vertues thereof do thence depend; and how lastly, their propagation is from natures skilful management of the same Principles perform'd; You may, I say, see further in our late *Philosophical Treatise of Fermentation*.

SECT. IV.

Hydroph. **B**UT before you pass from the discourse of your Principles as concern'd in Vegetation, and having touch'd somewhat relating to the Propagation of Plants in your piece of Fermentation: pray (*Pyroph.*) how are they (I mean your Principles) concern'd in that manner of Propagation of Trees, and perhaps some Plants by ingrafting and inoculation, and what improvements may thereby be made?

Pyroph. Well reminded (*Hydroph.*) For that we may nor busie out selves with empty and fruitless Speculations (the usual product

duct of your old Philosophy,) it will be necessary in order to the establishing and confirming our Hypothesis, to acquaint you in answer to your desire, that the ingrafting or inoculation of a Cion or Bud into the bole of a Stock in order to the propagation of Fruit-trees for the improvement of Nurseries, seems to me, *Hydroph.* to be nothing else but an artificial planting of those trees, as if they were indeed put into a good proper soyl, by putting their seeds into sutable beds of Earth; whereby the seminal Principles concentrated in the Seed, or contracted into those prolificke Buds, are put into their proper Matrix, which with other requisites concurring, are set into their vegetative spring, or fermental motion: And that the adaptness of stocks answers the peculiarity of soyls, in as much as all sorts of Cions are no more properly or with expected success, to be grafted or inoculated in any sort of Stock, than any sort of soyl is naturally fitted and qualified for every kind of Seed, only with this difference, that in the one (*viz.* the Earth) the juice prepar'd lies more crude, and scatter'd; yea, is more liable to casualties, especially to injuries by cold, while the other (in the sap in stocks) is more digested (if I may so say) and better collected into Vessels, and peculiar.

arstrainers, and lastly, is not so expos'd to casualties, nor so open to injuries by access of cold: Now that the bole of one Tree is as a peculiar soyl to the proper ingrafted or inoculated prolifque Gem (for both grafting and inoculation are but the planting or insertion of the same seminal Bud or Cion) is hence evident, because if Earth be so much cast up as to reach above the place of inoculation (or graft too, if I mistake not) after they have taken good hold and that it hath sent forth Branches, the prolifque bud casts forth fibrous Roots, just as if it (or the Seed) was originally put into so much well prepared soyl: so that the Root and Bole of a Tree do no other, (I mean as to ingrafting and inoculation) than prepare a juice fit for the nourishment, growth and increase of any other sutable Graft or Gem inserted therein; to which the aforesaid Gem imbibes and transmutes by its own fermental Principles, into its own nature, admitting not of the least tincture of the native disposition or seminal inclination from the assumed Sap, but dashing all those preconceiv'd seminal tinctures, make use of it to no other purpose (according to the intent of Nature in her great work of propagation, where she is so so exact and curious as in nothing more) than thereby to strike up the new vegetative
im-

implanted spark, whose Principles being thereby set a work, become fermental, and so imploy that juice in the fabrick of its own peculiar Body, guided and shap'd by its own plattick *faber*, I mean its foresaid seminal, and now (being exerted into motion) fermental Principles, carrying on the building by its intestine slow-pac'd collision (vulgarly called Vegetation.)

Thus for instance, we commonly inoculate a fruitful Bud or Cion of an *Aprcock* or *Peach* into a *Plum*-stock, whose thriving, budding, putting forth Branches, &c. are no other than the evident indexes of the action of the seminal Principles of those inoculated Gems, which being set into motion (by requisites duely concurring) admit of the juice or Sap of the bole (they are inoculated into) becomes fermental, dashing the preconceiv'd seminal tincture of the Stock (whereby it was dispos'd to the putting on the form of a *Plum*-tree) transmutes that juice into its own nature, and so from the intestine struglings of the said seminal Principles of the instant inoculated Bud, proceeds the vegetation and growth of the whole, clothing it self with all those natural Liveries peculiar to the texture of such seminal prolific Principles.

Now that this sap of the Stock is as a
prepared

prepared soyl, or a peculiar Earth for the Seed to be sown in, and wherein it thrives as well (if not better) than in a natural soyl, is evident (*Hydroph.*) because if you throw up Earth (after it has begun to thrive and put forth Branches) above the place where it was inoculated, it takes Root by putting forth fibrous Shoots, which you may then transplant, (cutting off the former Root and Bole) and so it becomes an intire Tree of it self: and from the same causes it is, that you may by splicing (as the Gardiners call it) propagate as many Trees as you please: also by layers (as they are called) you may propagate as many Trees almost as there are prolifque Buds if they could all be conveniently laid, whereby every Bud (or as many as you please) gets a Root to it self, by taking in that Sap from the Earth, which they do from Stocks they are otherwise planted into: In all which, the seminal Principles are set a work and become fermentative, hurling forth bodies or clothings according to the form of the plastic *faber* seated in the Center: whence it appears, I say, that the Sap of the Stock is to a Cion or or prolifque Bud, as the Earth to a Seed, or as the Earth to a laid Cion.

Now the improvements, *Hydroph.* that hence may be drawn, are various, and that
in

in order to the acceleration, melioration, and fructification of some Trees in other Climates or Countries than where they naturally grow; Thus we daily see the Imps of an *Aprecock* hastned as to its fructifying, by being inserted into *Plum-stocks*, *Peaches*, by being put into *Aprecock*, *Flanders*, *Hart*, *Duke*, &c. *Cherries*, put into wild or black *Cherry-stocks*, &c. which thereby in two or three years become Fruit-bearing-Trees, which would not in many more, if set from a Stone or Seed, or propagated from a slip'd Cions: which are not thereby only hastened as to their growth and maturity, but also are bettered thereby, both as to bulk of Fruit as also pleasantness and gratefulness of taste.

Thus probably the prolifique Imp or Bud of *Quinces*, skilfully put into early *Apple-stocks*, might hasten them as to maturity; later *Grapes* of a more delicate taste, artificially inoculated into more early, might do the same: yea very likely if accurate tryals were made of this nature, probably not only *Melons* (as to Plants) inserted into *Pompi- ons* might make them both more early and more large, especially if the Seeds of *Pom- pion* should be brought up in hot-beds to be ready early in the Spring, while the other are also foster'd in the same, till they were
fit

fit for inserting: But also many other rare observations might be made concerning other maturations and meliorations of Plants and Fruits, not yet taken notice of.

As to the third improvement, *viz.* the assistance of Nature by Art, in the fructification of some Trees in other Climates or Countries than where they naturally grow; Thus probably if the prolific Bud of *Oranges* (train'd up from their seedlings in hot-beds, or other suitable soyl) were inserted into some sort of Trees that grow well with us, and seem somewhat to resemble them, as for instance in some choice *Apples* (as *Pippins* or *Pearmains*) or in *Quinces*, thence we might very probably have *Oranges* to grow frequently with us in *England*: for the reason, why such tender Trees (more accustomed to hotter Climates) do not fructify with us, is chiefly through the defect of concurring causes, (which I above call by the name of Requisites duely concurring) amongst which are most considerable the want of a competent heat, or the presence of our intense cold or frost in the Winter time, which reaching the Roots of such tender Trees, prevents their Fruit-bearing by suspending the fermental action of the Principles, if not totally kills them.

Now (*Hydroph.*) according to our already
ready

ready prov'd supposition, that Stocks answer Soils, and are really as such to prolific Buds: therefore if instead of training up *Orange-Trees* from hot Nurseries, we take their prolific Imps, which we can by hot Beds easily procure, and insert them by Inoculation into the Stocks or Branches of any, or the most likely of those Trees aforesaid, we thereby secure them from intense Frosts we usually have in Winters, the chief defect amongst requisites concurring, and which hinders otherwise the Fruit-bearing of some Trees in other Climates than naturally they spring up in: which, I say, being remov'd by the aforesaid artificial Expedient, gives great likelihood of having upon such tryal, plenty of *Oranges* growing with us in *England*.

Thus also if the fruitful Buds of Figgs (which rarely in *England* come to maturity for want of heat, and chiefly by being late) were inoculated into some sort of good Pears (for instance *Bergamots*, or some other early Pear) or Branches thereof, might probably procure their maturity: and thereby to sit peaceably under the improvements of our Vines and our Figg-Trees.

Amongst the aforesaid due requisites necessarily concurring, I chiefly mean Climates, and thence different Soils (although there are

are also great variety of Soils under the same Climate) where, according to the difference of natural heats from the Sun, the Principles are put into a slower or quicker Motion, from whose more flat or sharp and agil collisions, some Bodys or Fruits are wrought with a courser or finer spun texture; or by longer weavings become more elaborate, and arrive at higher maturities, whence proceed Fruits of more delicate tast, affecting the Palat more gratefully.

What improvements (*Hydroph.*) might hence be made, nothing but matter of experiment will satisfie, concerning the meliorating, at least enlarging of *Collyflowers*, by taking the superannuated stem or bole of a choice sort of *Cabbage* (which the year before has been prevented of bearing Fruit, by cutting it off while young) and early thereinto the next Spring to insert a *Collyflower* (brought up in a hot or other prepared Bed, or preserv'd over Winter from its seed put down in *Autumn.*) And so many more choice Observations might be made, the truth of which only matter of tryal will evince and satisfie the curious searcher.

Lastly, What improvements might hence also be made (*Hydroph.*) is only here propos'd to further tryal, in order to the having of *Roses* (and perhaps other Flowers)

all the Winter long, by inoculating their prolific Buds at a due season into some *Sempervives*, or *Wintergreens*, I mean for instance in *Yew*, *Fir*, or *Pine*, especially if those Trees were assisted by some Artificial heat, as being planted near some Stoves or Furnaces (if found that that would accord with their constitution) where heat was kept and conveyed to them all Winter long: For the Principles in any prolific Bud being set into motion, by being planted in any proper Stock, the Juyce of that Stock being warm'd by any adventitious heat, or what way so ever kept in action, becomes like a Soil fitted for them, whereby the aforesaid Principles become fermental, and by a slow pac'd intestin collision becomes the essential cause, yea, is the very *ratio formalis* of vegetation and growth, by which the Seed, like a seminal *Faber*, works until it have hew'd forth its own body, & be cloth'd with all the shape, lineaments and proportions answerable to the Antitype or latent-Idea couch'd in the central point, and exert all the powers capable of emerging therefrom, by putting on the intire form of the whole Plant or Tree.

SECT. V.

Hydroph. **A**S you have expeditiously enough illustrated what you mean (*Pyroph.*) by your Principles as seminal and fermental in order to the generation and production of Vegetables, and towards the solving many remarkable *Phænomena* thereof; concerning which what you fall short in here, it seems you make up in your Treatise of *Fermentation* already extant, and in your *Tentamen Physiolog.* you have ready for the Press: So pray (*Pyroph.*) give us some touches concerning your Notions, how according to your Hypothesis, you apprehend the generation of Animals, and their most noted appearances, are perform'd from your aforesaid Principles.

Pyroph. In the generation of Animals from their seminaries, the aforesaid Principles (if I mistake not, *Hydroph.*) are no less (*suo modo*) conspicuous, than what I have illustrated them to be in the production of Vegetables; and that both as they are Principles lock'd up in some minute portions of epitomiz'd matter, and likewise as they, being by requisites duly concurring, put into motion, become fermental.

For we account of Generation of Animals no other than an evolution or natural expansion of the implanted seminal Principles contain'd in the minute *Embrio*, and rendred prolific by the fermental odour (if I may so say) of a masculine Ferment ; we cannot otherwise reckon, but that the noblest of fermental animal Juices (in order to propagation) and where the spirits are most vigorous, and secund, is the masculine sperm of Animals ; which is a digested spermatic Elixir, capable of tinging those more crude feminine Juices, or a natural, but highly prepar'd liquid Magistery, circulated and brought on to maturity in its peculiar vessels : yea, the very efflorescence, (if I may further add) of Animal Juices, impregnated at due seasons with such a stock of spirits, emerging from a fermentation proper to it self, as renders it capable of inspiring those feminine *ovaria*, or uterine Vesicles, with a subtile, but very active Ferment, which awakens those minute dormant, and otherwise steril Embryo's, sets them by its own vigorous action into a sort of (if I may say) vegetative, or expansive motion.

It's not the gross body of the prepar'd masculine or seminal Sperm, or any visible juice, or sensible part thereof (however by

by circulation maturated) which is admitted into the female Matrix, as the worthy *Harvey* excellently shews in his Tract, *de generatione Animalium*, *Nihil in utero* (saith he) *post coitum invenias, generatura enim maris, brevi vel elabitur, vel evanescit: & tamen adsit aliquid, quod fœminam fœcundam reddat*; But it is a spirituous Ferment, *indolis contagiosæ* (of which the feminal Liquor is but the Vehicle) at seasons so heightened, as it (if meeting with an aptness of Reception in the Female) breaths upon the oviformal Embryo, invigorates it into activity, putting those implanted and close shut up Principles into Motion.

For the aforesaid industrious *Harvey* tells us, speaking of what is contain'd in the Female Matrix, in order to Conception,

De generat. Animal. 278. Quod ad procreationem fœtus spectat, omnia animalia eodem modo ab oviformi primordio generantur: siquidem in eorum generatione, hoc solemne est, ut primordium vegetale (ovi naturam referens) præexistat, ex quo fœtus producat: est hoc in omnibus vel ovum vel oviforme quid; And as he farther adds, *Inest igitur in utero omnium animalium conceptus primus sive primordium; quod teste Aristotele, est veluti ovum membrana oblectum, cui putamen detractum est.*

So that in the propagation of all Animals

(the noblest, and for whose sake the rest were made, not excepted.) the Embryo anchorite, or epitomiz'd Animal, shut up within the walls of each of the uterine Vesicles, or oviformal Membranes, retains its just and proportionable form and shape, how minute soever in that seminary oviformal original, inclos'd in the Female Matrix: and only waits for an inspiration from the active masculine, spirituous, and fecundating Ferment, which is to strike up those dormant Principles, into an actual Fermentation or animal fire, whereby the little Embryo (the seminal Principles being once put into motion) begins (from a supply of maternal Juices) by a fermental expansion and evolution of its parts, to vegetate and grow bigger, till from those rudiments, by a continual and successive gradation, the vital fire be struck up: whereby the womb after conception by the inspiring of the pregnant male Ferment is forthwith close shut up; nature being so solicitous in this great affair of propagation, & so wonderfully curious (both to prevent monstrous Productions, as also multiplicity of contemporary Births from frequent & inordinate Coitions) as that she doth, after Conception, seal up the Matrix (as I may say) hermetically, that not the least of Air, nor what is much more
sub-

subtile (*viz.* the Masculine Ferment) can have the least ingress ; The Animal and Mineral Ferments herein conspiring , that after impregnation of either (*viz.* of the Animal Embryo Juyce , or Mercurial Liquor) by their peculiar Seeds, the Matrix both Animal and Philosophical are (I say) both, the one Hermetically to be clos'd up, the other naturally seal'd up, and kept from all heterogeneous assaults, whether in the Air or else-where , till in the one, it be brought on to the maturity of an Animal Life, and in the other, be elaborated to the perfection of the Philosophic Elixir. Concerning the progress of which, in order to the *Exit* or Birth of the Embryo, we have somewhat enlarged in our *Hydrolog. Chymica* , and probably may do more elsewhere.

But how the same Principles in their fermentative Collisions in the Animal Juyces, are the cause (other requisites concurring) of the circulation of the Blood, the source of all Animal heat and warmth, the efficient of nourishment and growth : The cause of the generation of Spirits, and thence of Vital and Animal Functions (*viz.* Sense and Motion) of the Body, how the Fountain of all the several Ferments in the peculiar Vessels and Conduits of the Body.

Hydroph. But pray (*Pyroph.*) be not too concise in these great Matters: How in particular (according to your Principles) do you understand concerning the faculty of the Stomach, you call the Ferment thereof, which doth perform such wonderful effects? doth it by its innate heat according to our Philosophy) or by its acid Ferment, as of late several *Neoterics* have thought, or by some latent quality unknown to us: For it seems to be of a strange penetrating nature, as to be able to turn all the several sorts of Food into a *Cremor*, and thence fit it for further preparation in order to blood and nourishment?

Pyroph. True (*Hydroph.*) the work of the Stomach (let it be done by what Agent it will) is wonderful, and in that very thing Nature's path is very mysterious. That it consists not in an innate heat, is evident, first, because no degree of heat of what pitch soever imagin'd can perform the like Mutations or Reductions of Bodys. And secondly, because all heat is (according to our Hypothesis) the result of Fermentation, and therefore wherever the heat of the body was which is the constant effect of the intestine fruglings of the Principles contained in the Animal Juices, there would it necessarily follow that it should perform the like operation

tion in every part where it's found, but constant observation contradicts the consequent, therefore heat is not the cause of that dissolving action of the Stomach : And that it consists not in an acid Ferment (the more plausible of the two) will be evident from the deposition of what we conclude it to be. Lastly, that it is not from an occult quality will be clear from what we shall afterwards discourse of the inexistency (and therefore futility) of qualities.

But how, I say, a pure subtiliz'd Ferment is continually elaborated into a most depurate and refin'd Elixir, containing the most defecate Principles of the blood and aliment, whence blood is prepar'd, is by circulation conveyed from the blood into the Stomach, by the Gastric, and perhaps other Arteries, inserted into the Ventricle, where through the congenearness to our every day receiv'd alimental Juyce, can (by reason of its subtilty of parts) penetrate, dissolve, and unlock the compage of such alimentary bodys, and at length put them into a similar motion, by striking up their essential Principles into an intestin Collision, which is that very thing we call a Ferment, and is therefore here (according to our Hypothesis) the true cause of the stomachical Ferment, that great and almost universal *Alkabeft* of nature,

nature, that can dissolve bodys, though of many different sorts of Textures, where the same Principles are to be found which essentially more or less constitute all alimentary Concretes and Liquids too.

For I must tell you (*Hydroph.*) that the congenearness of Principles of bodys under very different Textures and various Compages, give the cause of their more universal solution by *Menstruums* prepar'd analogically thereto, yea and give the reason why the Principles of one are brought into motion by the action of the other; that is, by the congruousness of the Principles of the solvent to those of the solvend.

So that how the Ferment of the Stomach consists not in an implanted acid, nor any other native Ferment, peculiarly inherent in that part: But how it chiefly (if not solely) owes its original to the circulation of the aforesaid highly prepared, and much elaborated Elixir of the blood, which communicated by the foresaid ducts, by its great penetrability and agility easily mixeth with the assum'd aliment, and by the assimilation of Principles sets the whole mass into a fermentative motion, and thereby taketh in pieces its Compage by a genuine solution: For the universal constitution of all alimentary bodys, and by which they
all

all agree in somewhat that is common amongst them, consists in some texture or other of the two grand Principles, Acid and Sulphur : which fermentative Motion, I say, of the Principles by further solution, percolation, separation, and afterwards by yet more intimate commixtion is carried on to the preparing the blood and spirits, and thence to the elaborating the aforesaid volatile Elixir, which conveyed into the Stomach, compleats the whole round of digestions, and performs the whole circulation compatible to Animals in their great work of nourishment and preparation of spirits in order to Sense and Motion, and other functions peculiar to animal bodys : how, I say, all this is perform'd by the various collisions and elaborations of the aforesaid Principles ; what we only hint here, we discourse more at large in our *Tentamen Physiolog.* to which we refer you.

SECT. VI.

Hydroph. **W**Hat mean you (*Pyroph.*) by those active Principles you spake of before, viz. Fire, Ferments, Salts, and Solvents, by some of which all concrete bodys are taken in pieces, and new

textures or neutral Productions are thence made, and by which great changes as you say happen amongst Bodies.

Pyroph. I bring those mentioned (*Hydroph.*) at present under the notion of extrinsic Agents, which have a powerful efficacy in order to the effecting great changes amongst Bodies they are applicable to.

Hydroph. What mean you (*Pyroph.*) by fire according to your Hypothesis: for we suppose it to be the most hot, dry, and lightest Element, plac'd *sub concavo Luna.*

Pyroph. Your opinion (*Hydroph.*) of fire will not be worth the while to refute, and indeed I think will easily disappear of it self, upon the displaying of ours: By Fire therefore in this place, I mean the vulgar (*viz.*) the fourth (and sometimes the first) complication of our Principles of Acid and Sulphur, which consists in the highest collision, and intestine rapid motion, those Principles, sown or implanted in all combustible Bodies, are capable of; which although here we put amongst extrinsic, yet may also truly be reckoned as the greatest intrinsic Agent, in order to the great changes of the same Bodies from their own highly agitated Principles.

Hydroph. Are there not many opinions concerning the nature and essence of Fire?

Pyroph.

Pyroph. Yes (*Hydroph.*) Yours with the rest of your Hypothesis we reduce to six Classes, as you may see in our *Tentamen Physiologic.* where we undertake to shew the great extent of Fire enlarged to all its Dimensions, not barely confining Fire within the ordinary limits of that which is vulgar and culinary, concerning the illustrating of which, as considered in it self, and as applicable to other Bodies, from our Hypothesis we are not sparing; But also *de industria* do propose the consideration of Fire as extended to the solving the more general and universal appearances of Nature in the production of Bodies.

Hydroph. Why, how (*Pyroph?*)

Pyroph. By supposing the Genesis of all specific concretes compriz'd in the three-fold kingdom of Nature, to be nothing else but a certain Evolution and Expansion of seminal Principles, carried on by a gentle and mutual Collision of the mechanical Agents, which are the very groundwork of all natural Fire in Bodies: or rather, (if you please) to be nothing else (which yet amounts to the same thing) but certain *igniculi* or little Fires deposited and hid in so many minute portions, or Urns of matter, as there are variety of things, giving motion and vigour to every Body wherewith its cloth'd, to the completing

pleating thereof in all its numbers : so that every thing we converse with in its existency from Creation or Generation , represents somewhat miraculous to us *viz.* an *igniculus* or little Fire, burning after its manner, as made up from the very Principles of Fire mutually acting by a soft Collision, and yet the thing it self (wonderful ! and like the *Bush* which miraculously burn'd with Fire and was not consumed, *Exod. c. 3. v. 7.* as the Divine Philosopher in his *Pentateuch*, tells us, so this) is not consumed.

Hydroph. But why (*Pyroph.*) so lofty in your discourse, and so curious in your so high speculations of Fire ? these are strange notions, such as we read not of in our, nor other sort of Philosophy I have yet met with ;

Pyroph. Because I find, *Hydroph.* by considering Bodies in their Generation or Production, and in their reductions or unweavings, and the various *Metastases* and changes amongst themselves, I say by laying things well together, and by putting them into their due Balance, reducing them to their several Classes, that there are seven complications, or so many modes of Aggressions of the aforesaid Principles, Acids and Sulphurs : So that by searching into the depth of Bodies and into the various complications of their seminal Principles, we cannot but suppose
in

in Nature, so many sorts of Fires, hid in the bosome of things, as there are modifications of the Principles, by which they variously combine to the building of Bodies from their Rudiments, and to the raising them up from their seminaries or radical beginnings, also to the taking them in pieces or reductions thereof: and from which many and those the chief (yea perhaps all) *Phænomena* of natural Bodies or Concretes we converse with, may with a great deal of facility and perspicuity be genuinely solv'd; concerning which we designedly enlarge in our *Tentamen Physiologicum*.

SECT. VII.

Hydroph. **P**Ray, *Pyroph.* What are those seven Complications of your Principles, which you say are found in the great series and chain of the causes of things, and from whence you conclude so many Fires contain'd in the orb and shut up in the Centers of those Bodies we are concern'd with? How do you reckon them?

Pyroph. The first is when the Principles combine in such a peculiar Collision as that the ethereal matter is interwoven therewith, and is fomented by a continual supply from the

the perpetual circulation of the aforesaid *Æther*: of which sort, are those we call *Solar Fires*, because made from the same Principles as the *Solar* rays are: which I say consist of an Eradiation of *Solar* beams, springing from an incessant but peculiar fermentation in the Body of the Sun, and fostered by an unwearied circulation of *Æthereal* matter, (as we shew in our discourse of Fermentation:)

This *Solar-Fire* has a twofold consideration, First, *per se*, and Secondly, as it is transmissive or communicable to other Bodies.

Hydroph. How do you understand that first consideration, *per se*?

Pyroph. That from whose direct or reflexive motion, swimming through the vast depth of the *Æther* (called by the *Epicureans*, *Inane*) are produced by an eradiation the grand *Phænomena* of Light and Heat in the great Orb of the *Macrocosm*.

Hydroph. What I pray (*Pyroph.*) is light, as communicable to us from the great Fountain thereof the Sun, and as that grand *Phænomenon* by which all others are made to appear?

Pyroph. Light we suppose (*Hydroph.*) to consist in an illumination of Air, by a perpetual Emanation of *Solar* beams, issuing (as I said before) from an incessant, but peculiar

culiar fermentation in the Body of the Sun. That Light is not a quality of a lucid Body, as you define it, but a corporeal substance; and how it is necessary to the exhibiting variety of colours, and answers the rule of Dioptricks, we shall afterwards in its place discourse.

Hydroph. What is that we call Heat, as issuing from the Body of the Sun?

Pyroph. It is nothing else (*Hydroph.* If I rightly understand) but the reflexive motion of those *Solar*-Rays which in their Emanation from their Fountain, cause Light.

Hydroph. How are Light and Heat distinguished in their Causes?

Pyroph. They differ in this only: (*viz.*) That Light is the bare illumination of the *medium*, Air, by a direct Progressive motion of the *Solar* Rays from the aforesaid fermentation, as the proper object of the Eye, and by which all other things are made to appear, while heat is the reflexion or Reverberatory motion (as we say in our tract of Fermentation) p. 106.) of the same Luminous Beams (issuing from the said Fermentation) from the Earth or other solid Bodies, affecting (by that Fermentative motion) our Sensative Organs of feeling.

Hydroph. You have told us *Pyroph.* how you understand Light and Heat to proceed from

from the same Fermentative motion of *Solar* Rays, the one in a direct, the other in a reverse or reflected line: But how are those you call *Solar* Fires made?

Pyroph. I answer, (*Hydroph.*) that (besides what we have already said) by Concentration of the aforesaid Rays those Fires are made (*viz.*) from which Rays, (by Glasses contriv'd for the purpose) artificially concentred, are produced actual Fires, which will give Flame to, and Burn any Combustible. So that Heat is Fire in a remiss degree, or the same Rays thinly dispers'd in their vehicle the Air, while Fire is Heat in an intense Degree artificially concentred, and both are Essentially the same, that is, are really from the same causes.

And as to the second consideration of *Solar* Fires, *viz.* as transmissive, or communicable to other bodies, we mean such as hitting upon some peculiarly adapted Textures of Bodies, do by their congruousness fix themselves; and thereby are the causes whence several *Phænomena* (mentioned in our *Tentamen Physiologic.*) are easily solvable.

Hydroph. What is the second complication of your Principles, and what *Phænomena* in the main are thence solvable?

Pyroph. The second is, when the foresaid Principles do mutually accost each other by

a gentle Collision ; which is twofold, the one progressive from the Center : The other *Retrogressive* from the Superficies. The former respects the Generation and Production of things , as is manifest in every genuine Fermentation, both of Vegetables and Animals, whence the Vegetation of Plants, and the natural Fermentation of Animal Juices, conducing to their Generation, increase, and perfection or maturity ; The latter eyes Putrefaction; whose *Ratio formalis* is taken from the revers'd motion of the same Principles mutually acting , where by a different modification, the *Acidum* sets upon the *Sulphur* and thence produceth that putredness and fetidness the frequent effects thereof: concerning which Principles as considered in their Progressive and Regressive motion in order to the Production and Reduction of things, more elsewhere.

Hydroph. What is the third modification of your Principles, and the appearances in general referrable thereto?

Pyroph. The third is when the Principles by a stronger and more sensible Collision hit upon each other: and that's twofold : *viz.* Natural and Artificial; 1. Natural, as amongst Vegetables is manifest in their ripened Juices, whose Principles struggle with stronger Collisions ; also in *Hay, Lime, Straw,*
Corn,

Corn, &c. which have got moisture, being laid up wet: amongst Animals it's manifest in every spurious and exorbitant morbid Ferment, and lastly amongst Minerals, as is evident in every strong Collision of the Principles; and that either in their *Embryonative Juices* or in concrete Minerals, from whose Principles mutually struggling do all Natural Baths, yea all heats which arise from Metals or Minerals Naturally or Artificially perform'd, take their Original. 2. The artificial is manifest in every effervescence made between factitious *Alkalies* (fixt or volatile) and Acids; concerning which you may see more at large in our Philosophical discourse of Fermentation and in our *Tentamen Physiologic.*

Hydroph. The fourth you have mentioned before, which is the most high and rapid motion the Principles are capable of, whence you compute the *Ratio formalis* of vulgar or Culinary Fire, and thence also (it seems) solve the *Phenomena* thereto appertaining: But pray go on, *Pyroph.* to tell what your fifth is, and what thence results.

Pyroph. The fifth, is when the Principles after they are by the most rapid Collision brought to an ignition., are transmitted from their own into other Bodies, where pene-

penetrating are by a kind of a fixation lock'd up, thereby becoming the Authors of divers *Phænomena*, as is evident in the Calces of Metals made *sicco modo*, for instance of *Lead*, (in the preparation of *Minium*) *Iron*, and *Mercury*, in *calx vive*, in fixt *Alcalies* lately made, &c.

Hydroph. Now proceed on to acquaint us what the sixth complication of your Principles is, and what *Phænomena* in short are thereto referable.

Pyroph. The sixth is when the Principles are complicated by a certain Colliquation: whence the Fires thence resulting may (properly enough we think) be called *Colliquati- vi ignes*, which are threefold, 1. *Caustical*. 2. *Corrosive*. 3. *Putrefactive*. 1. *Caustical*, are either *Lixivial* or *Vesicatory*. *Lixivial*, are fixt *Alcalies* of Plants, fixt *Nitre*, *Calx vive*; *Vesicatory*, are Chymical Oyls, *Cantharides*, and some Plants, as *ranunculus*, *cicuta*, *urtica*, inward bark of *Walnut*, &c. 2. *Corrosive*, take their original from Mineral Principles colliquated by force of Fire; whence all *Corrosive Menstrua* are produc'd, there being as many *Corrosive Fires* as *Menstrua*; Some more *Corrosive* than others, according to degrees of the *Colliquation* of the Principles. 3. *Putrefactive*, whence also a threefold *Colliquative Putrefactive Fire*, (*viz.*) 1. *Pestilential*.

lential. 2. *Venenous.* 3. Properly *Putrefactive.* Concerning all which, and the appearances thence genuinely solvable, besides what is *obiter* delivered in our discourse of Fermentation we have at large treated in our *Tentamen Physilogic.*

Hydroph. Now *Pyroph.* hast to tell us of the last complication of your Principles.

Pyroph. The seventh and last, is when the Principles are fixed by an intimate and radical union, whence arise Fires of their kind, which by reason of the *fixity* and inseparable connexion of the Principles, they (as in an Orb above the rest of the Apparences of Nature) suffer no flagration of parts, nor admit of any injury by the strongest tortures of *Vulcan* or vulgar Fire (which consists in the fourth Complication of our Principles,) or any other below it self, as is evident in the Metals, especially the fixed, and in the *Philosophick Elixir.* Nor do they undergo any separation of parts, as appears in the *Liquor Alkabeft*, and *Mercury* of Philosophers, which by reason of the intimate and radical union of their constituent Principles, are liable to no sequestration of *Heterogeneities*, the common fate to most Bodies: from which Modification of the Principles of Fire it truly (if such there be in *rerum natura*) becomes the *Ignis Philosophicus*, otherwise call'd

call'd the Philosophers Sulphur, that hidden Tincture, so much believ'd by many, and those also learned men: which secret Fires apply'd to their proper Bodies, burn onely away their Dross, separating their impurities without the destruction or Consumption of their intrinsic Seeds originally implanted therein, whence is solvable the very *Ratio formalis* of the transmutation of Metals. Yea, and from this seventh complication of the Principles it is, whence probably those abstruse Maximes of the *Hermetic* Philosophers may genuinely be solv'd, where they tell us of their Water which burns Bodies, and their Fire, which moistens them; *aqua Philosophica corpora urens (viz. eorum betereogenea)* eademq; *madefaciens*, they burn with Water, and moisten with Fire, a great Paradox in Nature! through our ignorance in the abstruse causes of things, of which more interspers'dly in our *Lithologia*, and *Tentamen Physiologic.* but especially in our *Chrysologia Hermetica.*

From which Principles differently according to the aforesaid sevenfold Modifications complicated, the *Phenomena* of Nature in her works, are according to our *Hypothesis* easily solvable: concerning which you may see many considerable instances illustrated in our *Tentamen Physiologic.*

Hydroph.

Hydroph. It seems then (*Pyroph.*) that Fire in its genuine and Physical sense, is of a larger extent, than ever we dream'd of: For you make Fire or the Principles thereof, to be Seminal and Mechanical Agents, in all Bodies, especially in those from Seminal Productions: & these to be reckon'd amongst the intrinsic, but pray how are they as extrinsic Agents, so much concern'd in the great *Metastasis* and *Catastrophe* of Bodies?

Pyroph. When I accounted Fire amongst the extrinsic Agents, it was only as Culinary, viz. the vulgar (I mean such as our fourth complication of the Principles exhibits) and as considered applicable to Bodies already constituted, and to the changes thence issuing; that is, as the Principles of any combustible Body was by a rapid Collision brought into that highest motion we call Fire, as these I say were applicable to other Bodies (whose Principles in some Modification or other had woven the Texture thereof, and so lay dormant,) and did as adventitious Agents, excite the latent Principles into action, so they thereby become extrinsic Agents: thus the Fiery or combustible Principles being put into action in one Body, as suppose Wood or the like, this as an extrinsic Agent, is able to excite the same combustible Principles in any other combustible Body.

But

But it is applicable to other Bodies, as an extrinſick Agent, upon no other account than this, (*viz.*) from the congenearneſs of its Principles, to thoſe in Bodies it's applicable to: for as Ferments (to take them in the uſual acceptation) work upon no Bodies, but ſuch as have Principles *Analogical* to themſelves, which is the very *Ratio formalis* of ſuch Ferments acting upon other Bodies, (*viz.*) their congenearneſs: ſo Fire, no otherwiſe burns Bodies, than as its Principles being brought into a rapid Collifion, awakens the ſame ſort of Principles in Bodies it's applied to, exciting thoſe Principles into the ſame motion which lay dormant before.

SECT. VIII.

Hydroph. **H**OW do you reckon Ferments amongſt extrinſick Agents?

Pyroph. Much what as I have ſaid concerning vulgar Fire. For although moſt Bodies, (eſpecially Vegetable and Animal) lodge within themſelves, their own Ferments; by which they undergo that inteſtin motion of their conſtitutive parts, they are natually inclin'd to, as appears in the Vegetation of Plants, from the Fermentation of their genuine Principles; and in the Motion, Circulation, Generation of Spirits, &c. in the Fermentative Juices of Animals, yet theſe are

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also lyable to Mutations from extrinſick Ferments, being adventitious Agents, which according to the Degrees of their *Energie*, either excite or highten the native, or pervert them into that which is ſpurious: But in all alterations that are made by thoſe extrinſick Ferments, either by ſtirring up the ſupine (native) Ferments, or by graduating and advancing them in their vigour and ſtrength, do it I ſay always by a *conſimilarnes* of Nature; that is, by a congenearneſs of the extrinſick to the intrinſick Ferments, concerning which we diſcourſe more largely in our *Tentamen Physiologic*.

Hydroph. What mean you (*Pyroph.*) by Salts, which you reckon alſo amongſt extrinſick Agents, and concern'd in the Changes of Bodies?

Pyroph. I look upon them (*Hydroph.*) as otherſorts of extrinſick Agents, which applied to, and interweaving with other Bodies beget great alterations in their appearances: Thus for inſtance, *Quick-ſilver*, which is a fluid Body, doth by the interpoſition of Salts (as of *Vitriol*, *Nitre*, or *Foſſil Salt*) ariſe together by the help of Fire in the form of a white Cryſtalline Sublimate, when from the appearances of a fluid Body, and *Argent-Colour*, it becomes determin'd by the aforeſaid interweaving of Salts into a conſiſtent, ſolid,

solid, and white Body; as may be seen in the preparation of *Mercury Sublimate* both *Corrosive* and *Dulcis*: which solid Body shall become fluid again as Water, by the help of Fire, if thereto be added *Sal-Armoniack*, and filings of *Copper*, or the *Calx* of *Verdigreece*, remaining after the distillation of that *Spiritus Veneris*, so called by *Snelfer*.

Thus also two *Saline* fluid Liquors, (the one made by putrefaction and Distillation, either from Animals or Vegetables, the other by distillation prepared from Fermentative Liquors) put together, shall lose their fluidity, and become a dry *Osta*; as is conspicuous, not only in the well known mixtures of Spirit of Wine, and Spirit of Urin, Blood, *Sal-Armoniac*, Plants, &c. but also two Mineral Liquors (mentioned in our *Hallolog. Chym.*) mixed, a dry *Osta* may be made: likewise Oyl of *Vitriol* pour'd upon a peculiarly prepar'd *Vitriolin* Liquor (to be mentioned in the aforesaid Treatise of *Salts*) turns to a blue Clay: And as some fluid Bodies, by Salts, as extrinsick Agents, become Solid; so some Solid Bodies by Salts, become fluid, as for instance *Butyrum Antimonii* (*viz.* Butter of *Antimony*) in a gentle heat, is as fluid, as an Oyl of a strong Body, and yet consists of the Flowers of *Antimony* brought into that form,

by the additional Salts, before contain'd in sublimatè: so Antimony by Salts loseth its colour: Thus from black, with the addition of Salts, it becomes brown, or yellow, as in the Hepar of Antimony, and from thence by further addition of Salts, and Calcinations, it becomes a lighter yellow, at length white, with a sleight yellow reflexion, as is evident in *Diaphoretic Antimony*, in *Mercurius Vitæ*, and *Bezoardicum Minerale*, concerning which Mutations amongst Bodys you may see more in our aforesaid Discourse of Salts.

Hydroph. What mean you (*Pyroph.*) by Solvents, the last you reckon upon the score of extrinsic Agents, in order to the changes which happen amongst Bodys?

Pyroph. By Solvents I understand all or most sorts of *Menstrua*, whether preparable amongst Animals, Vegetables, or Minerals; amongst Animals, such whose energetical *Crafsis* depends chiefly upon volatile *Alcalies*, and those as more or less complicated, or colligated with their connate Sulphurs: amongst Vegetables, such, where first either the Sulphur is depressed, and the *Acidum* prevalent, as in all Acids or Vinegars distillable from the fermented Juices of Plants, once deprav'd, viz. in Vinegars, Alegars, &c. or their Spirits: or Secondly, where the
Acid-

Acidum and Sulphur are in *equilibrio*, as in all vinous or other fermentative Liquors : Or Thirdly, where the *Acidum* is depressed, and the Sulphur exalted, as in all vinous Spirits; distillable from fermentative Liquors : Lastly, amongst Minerals, such where first the Acids prevail and are thin, or lean, as in Spirit of Vitriol : Secondly, where the Acids imbibe and colliquate more of their Sulphurs, as in Spirit of Salt : Thirdly, where the Sulphurs prevail, and yet are bound down by a strong Colliquation with their Acids, as in the Oyl of Vitriol, Sulphur *per Campanæ*, *Aquæ Stygiæ* : or lastly, where the Sulphur is most prevalent, as in Oyl of Antimony : In all which there are real (although gradual) Colliquations of the Mineral Principles, with what alterations they make upon other bodys, they are applicable to, and that as they are extrinsic Agents, not only the *Chymical Dispensatory's*, but also our *Halolog.* or *Discourse of Salts* do abundantly illustrate.

Hydroph. How do these extrinsic Agents you have mentioned, accord amongst themselves, and how thereby reconcilable to your Hypothesis ?

Pyroph. Because, as I said, Fire (*viz.* the vulgar) made from the fourth Complication of our Principles, was applicable to

other body (whose Principles otherwise lay *dormant*.) as an extrinsic Agent : so if we take Fire in the largest sense, as extended through all the seven Complications of the Principles, whereby (according to our Hypothesis) it is concern'd in the Fabric of most (if not all) bodies; then we shall find that even the other three (*viz.*) Ferments, Salts, and Solvents, are in one sense or other most-what reducible thereto.

Thus Ferments are compriz'd chiefly in the second and third Complications of the Principles; and Solvents in as much as they depend (for the most part) upon the Colliquation of the Principles, do most-what result from the sixth.

The greatest difficulty I find, is in Salts as Agents, and in petrific Concretes, *viz.* how Salts in their concretions, and Stones in their nativity, are comprisable within the sphere of our Principles, and reconcilable to our Hypothesis; concerning Salts, how they all in their several concretions comprehend a Sulphur, in one degree, mode, or other, lockt up in their Compage; And how a ten-fold complication of the Principles of Salts are necessarily to be considered in order to all the various Concretions, they are in Nature or by Art (in imitation of Nature) reducible to, and concerning the
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manifold *Phænomena* thence solvable : For (for instance) one saline Liquor by the addition of another Salt or Body, doth assume the form of an Oyl, Butter, Jelly, Clay, Osta, &c. is demonstrated by particular Examples and Illustrations : Also how Salts do preserve bodys they are apply'd to from putrefaction, by preventing the access of somewhat in the Air, which is concern'd in the setting those retrograde Springs in motion, I mean in putting the Principles into their reverse and analytical Fermentations, shew'd in the taking bodys in pieces by putrefaction : And lastly, how these Principles may be arrested from their Motion and suspended from their putrefactive Fermentations, by additions not only of Salts, Frost, Air, Fume of Brimstone, and additionals of other Condiments; but also by bare but artificial Extrusions of Air, concerning all which at large you may further see in our *Halolog. Chym.* (almost finish'd upon that Subject) when extant : and as to the Nativity of petrific bodys, from their intimate and essential causes, both as relating to the *Macro*, as well as to the *Micro-cosme*, you may consult, when extant, our *Lithologia Physica*, being a Discourse of Petrification.

Hydroph. Wherein (pray *Pyroph.*) do
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your Principles differ from the *Corpuscularian*? For you seem in some things to strike in with their Hypothesis.

Pyroph. If you will observe (*Hydroph.*) you will find, as in many things it accords, so it differs much; for theirs supposeth in the main matter mov'd, which also includes in it the figure, shape, and size of the parts moved, reducing them into certain minute figur'd parts, irreducible into less, which convening in such and such numbers, with others of different figure, combine together under the mask of some other figure than before, and so constitute this or the other body, shap'd according to the texture of those parts so collected and united together; whereas ours, although it include much of this Doctrine, especially that of matter mov'd, and under the consideration of variety of figure, shape, and size of the constituent parts: yet herein it differeth, first that it doth not consider the parts as reduc'd or reducible into indivisible, and yet figur'd points; But supposeth all the however minute parts of matter which do accost our senses, or make any alterations in our Juices (by which we usually make an estimate of their Figures or take their Dimensions) to be yet divisible into less parts, whose figure as not necessarily

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ry to the constituting, so not needful to be reckon'd upon in our Calculation of the Nativity of Bodys.

And Secondly : We suppose the natural or physical division of parts, to transcend by many degrees that of Mechanism how acutely and artificially soever perform'd : which physical sub-division we (in our Discourse of Fermentation, and in our *Tentamen Physiolog.*) ascribe wholly to the Energie of Ferments, viz. to the subtile Collisions of our Principles mutually acting, which is able to knock off every Angle, to perforate every Solid, and to split in pieces every Globula of Matter, that upon such Figures fall under our cognizance.

Hydroph. But pray (*Pyroph.*) first, Why are your Principles call'd Mechanical? Secondly, Why do not your Principles, as reducible at the long run into Water, forfeit their Natures or Essences of Principles?

Pyroph. I answer (*Hydroph.*) as to the first, they are call'd Mechanical, because material; and next, because being as such, and set into their peculiar motions are sufficient for the physical Mechanism and structure of all bodys, or such as Nature employs (as we suppose) in the Mechanism of all specific Concretes throughout its three-fold Kingdom: so that to the building of

all bodys from intrinsic Agents, these are (according to our Hypothesis) necessarily and essentially requisite.

And as to the second, I answer (*Hydroph.*) that although these Principles be the proximate Agents, and primarily to be considered in order to the hewing forth of Bodys from their material original water, determining water into this or the other specific Concrete: yet we do not esteem of these active Principles to be otherwise than material, only spiritualiz'd or subtiliz'd Matter, for Spirit, in our Physical sense, we only look upon as subtiliz'd matter: and therefore as such at the long winding off, are reducible into water, or convene in such a fluid texture of parts ascribable to water.

SECT. IX.

Hydroph. **B**UT do not the Atomical Philosophers and you agree in the main, in the Principles and general affections of bodys afore-named?

Pyroph. Yes, But besides what I have already said wherein ours chiefly differ from theirs, we must also crave leave to tell you
(*Hydroph.*)

(*Hydroph.*) that we dissent from them in those extravagancies, which renders it justly to be reputed heathenish or vain Philosophy, especially as they sprang from the old Fountain, witness the roving fancies of the first starters of the *Corpuscularian Doctrine*; I mean of *Epicurus*, *Democritus*, *Leucippus*, *Lucretius* and the rest of that *Classis*; whose opinion was, that matter and motion was Eternal; and that innumerable worlds were generated by the fortuitous Coalition of Atoms, as *Magnenus* tells us out of *Diogenes Laert.* *Seneca*, &c. Witness, what *Claudianus Pan.* elegantly describes in these lines, speaking of *Democritus*,

*Ille ferox, unoq; tegi haud passus Olympo
Immensum per inane volat finemq; perosus,
Parturit innumeros angusto pectore mundos.*

So that according to their opinion, the World & all the mixt Bodies therein were huddled together by the Justlings, Counter Scuffles, and Duellings of Atoms, which by accidental jumpings into such and such postures and figures, produc'd such and such figurative sensible Bodies as make up the whole pompage thereof: whence *Virgil* in his *Eclogues* gives a hint of that Doctrine.

Namq;

*Namq; canebat uti magnum per inane coacta
 Semina terrarum, animæq; marisq; fuissent,
 Et liquidi simul ignis, ut his exordia primis
 Omnia, & ipse tener mundi concreverit orbis.*

For they suppose matter out of which the World is made Eternal, and by their *inane* an infinite space, wherein infinite small Particles or Atoms of that matter are contained, which *Atoms* (we might think) being game-some and frolick, might make infinite congresses, running a tilt upon each other, and that without any designation or appointment of any Divine, Supreme, intelligent power, twilt upon each other, and by a blind (I know not what) *impetus*, by chance strike the figure of so many Worlds and amongst the rest, form the beautiful regular compage of that World we see: and that the Earth, while in its vigour and fertility, brought forth Men and other Animals, as now it doth Plants: So that they suppose the generation of mixt Bodies, to be nothing else, but a congregation, and corruption to be a segregation of Atoms; and all this *sine numine divino*, without any Divine *Fiat*, and therefore may well be called heathenish or vain Philosophy.

Hydroph.

Hydroph. But pray (*Pyroph.*) is not that Philosophy or knowledg of natural things the best, whose Principles doth best agree with and come nearest to the *Mosaic* and consequently Christian Philosophy?

Pyroph. Yes (*Hydroph.*) without doubt.

Hydroph. Well then surely ours, I mean the *Aristotelic* Doctrine of natural Bodies must be the best: for we own a Divine power, that has not only created, but by the same upholds all things in the World.

Pyroph. So far (*Hydroph.*) is very well, and that which every solid Hypothesis should suppose: But to lay such a foundation of fruitful Principles, as to make the Doctrine of natural Bodies the most intelligible, and thereby to solve the various *Phænomena* most demonstrably, is the main matter.

Hydroph. Why? is not our Doctrine of the four Elements, Principles large enough, to erect a true Hypothesis thereby of natural Bodies? Are not all mixts produc'd therefrom and ultimately resolv'd thereinto?

Pyroph. To which I answer, that the four Elements as they are by *Aristotle* and his Commentators laid down, as the *materia proxima* of all Bodies, are both too strait and narrow to raise up a Structure of Bodies therefrom: as also too many to enter the composition of natural Concretes.

Hydroph.

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Hydroph. Why? How are they too strait? Are not all Bodies made up with Fire and Air, Water and Earth? Are not these (*Pyroph.*) the beginnings of all Bodies?

Pyroph. These four Elements (*Hydroph.*) are too strait, because all natural Bodies in their genuine *Analysis* are not resolvable thereinto: and such are demonstrably Principles or Elements into which mixts are ultimately reducible.

Hydroph. Are not our *Quaternary* of Elements such? In as much as they are (according to our Hypothesis) simple *Homogenial* Bodies, from which all Concretes are primarily compounded, and into which they are ultimately resolv'd; which for instance enter the composition of the Body of Man, as well as other mixts: For we read *Gen. 3.* That upon the Curse, Man was to return to the ground out of which he was taken: So that Earth must be one main ingredient of the Body of Man; which Earth unless it be bound up with a Watery moisture, as with Glew, would fall from together; and therefore must needs suppose Water another Element in the Fabrick of the humane Body; So that there is Earth and Water, and because as we suppose all Generation is made up of contraries, therefore Air and Fire as
contra-

contraries to Earth and Water must also be of necessity there: That the immoderate driness and coldness of Earth and Water may be temper'd with the moisture and heat of Air and Fire; and so all be brought to a kind of equality. Besides, *Ex iis constamus ex quibus nutrimur*, but we are nourished by the four Elements and Bodies thence made, *Ergo*.

Pyroph. Here indeed you seem to come pretty close to the point *Hydroph.* by an experimental Induction (as you suppose) of the humane Body, in the Fabrick whereof you conjecture the four Elements to become the *principia materiata*, and that not only of man's but also of all other mixt Bodies in the World, and this you do, by first taking in the Element of Earth, as the Basis of the rest, and that you ground from *Adam's* return to Earth from whence he was taken; which was part of the sentence God pronounc'd against Man for his disobedience at the fall: I must tell you (*Hydroph.*) that this is no Argument for Earth as a simple Homogenous Element to enter the composition of the Body of Man: for that sentence, *Thou shalt return to the ground, for out of it wast thou taken: For dust thou art, and unto dust thou shalt return*, seems to me to intimate no more than thus (*viz.*) that seeing Man by his

his transgression had forfeited his right to an Eternal and Immutable Inheritance (which upon his obedience had then been confirm'd upon him) he had now upon his disobedience a Sentence of the Mortality of Body pass'd upon him; and that after the revolution of some years, his Body should undergo the same vicissitude and Law of Mutability, with other temporary transient mixt Bodies in the World: *Dust thou art, and unto Dust thou shalt return*, intimates a Reduction of the Body into its primitive minute parts whether in a liquid or dry form, whether reduc'd into a Juice or *Leffis* of the Earth by the *fracedo* of the Grave, or that Juice further coagulated into some Species of Earth:

For the word in the Original is not **הָאָרֶץ** by which Earth is signified as being the Sublunary part of the World distinguished from the Heavens or Coelestial Bodies, but is **הָאֲדָמָה** which intimates a red elixerated Earth, where an efflorescence of the *Panspermion* of the *Macrocosme* becomes concentrated; in as much as **אֲדָמָה** which takes its original from **הָאֲדָמָה** is the *Microcosme* or little World, which is the *Epitome* of the great World. And although (*Hydroph.*) we should admit Earth as a constituent Principle or Element of Bodies, which yet in our *Hydrologia Chymic.* by several Mechanical Experiments have

have demonstrated Water (not Earth) to be the material Principle of all Concrete Bodies) and so to take in Water and Earth as two Elements of Bodies, I say notwithstanding that Adoption of Earth to be an Element, we see no reason for a necessity of taking in the other two of Air and Fire as Principles of Bodies: which you ground upon this Supposition that all Generation is made up of contraries, (which yet in some sense is true, as elsewhere in our Doctrine of Fermentation we shew) and therefore having Earth and Water granted as two Elements, you conclude a necessity of Air and Fire to temper the other, and bring them into an equality by their contrary qualities.

For if we can, *Hydroph.* (as we may elsewhere) solve those primary qualities of heat and cold, dryness and moisture, without having recourse to their subjects of inhesion, as the Elements are reputed to be: then those Elements (at least as to the *quaternary* of them) must of necessity cease to be primary constituent Principles of Bodies, seeing the Elements in order to the Fabric thereof are to do it by their supposed *συζυγίας* or combination of qualities.

And altho that of *Aristotle* be true (*viz.*) *Ex iis constamus ex quibus nutrimur*, yet the Assumption or *minor*, which commonly is annexed

annexed thereto (*viz.*) but we are nourished by the four Elements, and their Concrete Bodies, is as false: which although they further endeavour to prove by the instance of Plants, of which we feed, these are (they say) nourished by Earth and Water, are cherished by Heat, which proceeds from Fire, and are preserv'd by Air, and therefore we feeding upon them, feed upon the four Elements, of which they are made.

Whereas (*Hydroph.*) we elsewhere acquaint you, how Plants have not their original from the *Quaternary* of Elements, but from Seeds and specific Ferments, which determine the motion of matter, into such variety of shapes, which we usually see them distinguished into, and that chiefly upon matter, whose parts are so wrought as to become fluid, I mean Water, which is the proximate material Subject of most (if not all) Concretes, whether in their *Genesis* or *Metastasis*.

Hydroph. But I will give you another instance, how we understand the four Elements, to be the Principles of mixt Bodies, and that is by the destruction or reduction of things into those Principles from whence they take their Original; as suppose in burning a piece of Wood; you may (*Pyroph.*) view a separation of the four Elements, for the

the fumes go into Air, the expressed moisture of the Wood is of the nature of Water, the Ashes is of the nature of Earth: and lastly the Fire or Flame is obvious enough to the Eye.

Pyroph. This experiment of the burning of Wood, evinceth nothing, *Hydroph.* of the pre-existency of the *Quaternary* of Elements, by its reduction into Fume, Moisture, Ashes and Flame: For that by which (according to the *Peripatetic* Doctrine) you would have Air to be demonstrated to be a constitutive Principle of Wood, is the fume: which if so, then must this Fume be like the Air a simple *Homogenial* Body, which yet how simple so ever you may repute, we know *Hydroph.* how to separate by the *Pyrotechnic* Art, five or six several distinguishable things: as if done in close Vessels, a four Spirit; if openly, it separates a foot to the sides of the Chimney, as of a great receiver: from which we have separated a Phlegm, Spirit, Volatile-Salt, Oyl, and *Caput Mort.* enough to make it justly be denied the being a simple Elementary Principle: and therefore some do two things at once, (*viz.*) both char their Wood, and at the same condense the Fumes in large receivers or pipes, whereby they get the four Spirit: For the charring of the Wood, is nothing

thing but a fixation of the Sulphur, with the Salt : which Sulphur before would flame forth, but now being smothered , it only glows in the Coal.

So that that whereby you would demonstrate a reduction of Wood into the Element of Air, by the Fumes thereof, you see (*Hydro.*) how we find it to be a mixt Body it self, consisting of *Heterogeneous* parts, many of which are further reducible into more primary Principles ; yea even the very acid Spirit, made by distillation of Woods, as of *Guaia-cum*, *Box*, &c. Which one would deem (if any) to be a simple Liquor, is yet by addition of *Alkalizate* Bodies, such as are *Coral*, *Crabs-Eyes*, *Pearl*, fixt Salts of Herbs, &c. is reducible into a piercing Liquor quite of another sort than before, which I have also observ'd from the acid Spirit of *Verdigrease* dinted or mortified by a fixt *Alkali*, to have by further distillation, been reducible into a quick penetrating Spirit, not acid at all, but very much emulating the Spirit of crude *Tartar* ; which will not (as Acids usually do) change the Syrup of *Violets* into a red Colour ;

And as to what you say (*Hydroph.*) that the expressed moisture in burning the Wood, is of the nature of Water : this very thing I say has an *Empyrenumatic* odour, which is further

further reducible, and therefore forfeits its badge of a primary or Elementary Principle: As for the remaining Ashes, which you suppose to be of the nature of Earth, you are mistaken, for they are a great part of them separable in the form of a fixt Salt, which is quite another thing than that you call Earth.

And further, that this very Earth separable after the *Calcination* of the Vegetable and *Elixivation* of the Salt, is not Elementary, will be evident from the following experimental Observation: for from about 200 weight of Oak-wood, first char'd, and then burnt to Ashes, I had but 3 pound of Ashes, which by *Lixivating* gave me 5 ounces of fixt Salt and about 2 pound 8 ounces of insipid Earth: which very Earth I say was no more to be accounted an Elementary Principle of the aforesaid Wood, than fixt Salt thence produc'd by *Calcination*, because the like quantity of Wood being otherwise handled by Fire (besides what different products would result from other Agents) *viz.* by a naked firing (without any previous charring) gives a larger proportion by much of fixt Salt, than the former; which very fixt Salt, may also by frequent *Calcination*, *Solution*, *Filtration*, *Evaporation* or *Distillation*, may I say, be all converted into an Earth (the same the
Wood

Wood char'd was reducible to) and *Phlegm*: & no Philosopher ever admitted fixt *Alcalies* (such as are produc'd by Fire from a Plant) amongst Elementary Principles, or if any did, yet was easily refutable by the aforesaid experiment: so that its hence clear (beyond Ambiguity) that Earth in the composition of Bodies is not an Element, but a Product of the Fire, as we further illustrate by other parallel experiments in our *Tentamen Physiologic*.

And lastly, that the flaming of the Wood should indicate an Elementary Fire, is somewhat strange: For this Fire in the Wood (which we reckon to be made by our fourth Complication of the Principles as aforesaid,) consumes, or rather reduceth it into more simple Bodies; which yet are most what new Products of the Fire, and other twistings of the same Principles: whereas an Elementary Principle, should rather constitute, than destroy Bodies: So that none of those are at all demonstrative of the *Quaternary* of Elements.

S E C T.

SECT. X.

Hydroph. **W**ELL (*Pyroph.*) but we do not suppose that all mixts are immediately reducible into the four Elements; but many bodys first change into other forms, by a kind of vicissitude, and yet at the last are resolvable into the four Elements, of which they consist: Thus Herbs, and other Food, we take for our nourishment, undergo various changes, in our Bodys, into Chyle, Blood, Flesh, Bones, &c. and after Excretion, is converted into a Stercus, which at length is resolv'd into Earth.

Pyroph. It's true, (*Hydroph.*) let us imagine what Hypothesis we please, yet are not concrete bodys always immediately reducible into their first constituent Principles, but sometimes undergo a transposition of parts, whereby they acquire a new form, and so a second, third, and soon in a round of vicissitudes, before there happen a total Analysis into its primitive Principles or through-resolution of a Concrete into its *Minima*.

But that this ultimate reduction of Concretes, should always at the long run, prove the

the four Elements, is not me-thinks (*Hydroph.*) demonstrable by your propounded instance of Herbs, or other Aliment, taken into our bodys, for nourishment : For that they admit of various Mutations, according to the different digestions they pass through, is that we cannot deny ; but that these should be intermediate changes of our Food, before it be ultimately reduc'd, into the Quaternary of Elements ; is that we are not to let slip unexamined.

And first we are to consider, that towards the making of changes amongst bodys, out of one form into another ; where there is the same material Principles substituted, and only a *Metastasis* happens ; there must, I say, of necessity concur the super-induction of new Ferments (or other sorts of extrinsic Agents, as aforesaid) which by macerating, subjugating, and altering the parts, may raise up a new Structure of a different form, than was before, and yet that body no whit the nearer to a reduction into its Elements now than before.

So that what changes, or alterations our Food undergoes in the several digestions of our bodys, are to be ascrib'd to no other than the different Ferments it passeth through ; which altering the texture of the parts, subverts the first, and bringeth on a
new

new form ; so from the form of Beef, Mutton, Bread, Beer, &c. (though different amongst themselves) yet by the uniform operation of the Spirituous, elixerated Ferment of the Blood, thither in its circulation transmitted as aforesaid, become altered, or transmuted into a similar Chyle, or *Cremor*, which being refin'd through the strait Colanders of the *Vena lactea*, by which it is percolated from the dreggy *Feces* along the *Duodenum*, *Colon*, and *Ilion*, and further purify'd in the Glandules, is sent up by the Thoracical Vessels, into the Jugulars, where it's let into the ascending Branch of the *Vena Cava*, becomes dasht with blood, and by coming to the Heart, where, by the Air in its circuit through the Lungs, it's volatiliz'd, and assumes the form of vital blood ; which being carried along the *Aorta*, and other thence branching Arteries, sublimes or distils into pure volatile Spirits, for the supply of the *genus Nervosum* ; part of which mean while being carried into the whole habit of the body, becomes coagulated in the fibrous parts, into Sinews, Flesh, Bones, &c. according as it is determin'd, and arrested by the particular assimilative Ferments of the several parts.

Next to which (*Hydroph.*) we are to
F consider,

consider, the humane as well as other mixt bodys, during the revolution of their specific Ferments, are in a constant perspirability; always (I mean during the season of the vigour of their genuine Ferments) a making up, and as often resolving, or taking in pieces, (*viz.*) in a perpetual flux of constituent Elements; otherwise what means the continual supply we have from daily nourishment, by fresh Food? For if there were not a constant flux, and wasting by perspiration, we need not so constant a supply by Food.

In as much as when we come to a full maturity of years, as to the Vegetation, or growth of our bodys; which is from 18 or 20 till towards 30 years (some sooner, others later) Then what ever of Food we take in (deducting what is separated, as Urin, Excrements, and the like) as much, I say, of real nourishment, as is by the digestive Ferments daily made thereof, so much do we transpire, and loose: so that supposing by compute, that in most bodys, every day (I mean while in health, and Ferments strong) 7, 8, or 10 ounces of fresh blood may be produc'd: and yet notwithstanding suppose most men to be weigh'd at 24, 26, or at furthest 30 years of age (excepting some few that may by the more than ordinary coagulation

coagulation of that which should transpire, after those years, grow fat, and gross) and again at 40, 50, or 60 years, it will be found, that generally there is no increase of weight at all during that time; and yet, I say, so much blood is spent every day in nourishment, and so much of the ultimate assimilated aliment is daily transpired, and all this without any residence, or *caput mort.* of the blood, being constantly (whilst the Ferments, Spirits, and Organs are sound and regular) volatiliz'd by a Ferment from the Air.

And yet this Blood is made from various kinds of Flesh, Fowl, Fish, Bread, Drink, &c. all which lose their pristine form by the power of the specific Ferments, through which they pass: so that if I should tell you (*Hydroph.*) that when we come to 20, or 30 years of age, and so on, we have not the same numerical bodys as we had in our infancy; nay, perhaps not the same we had 5 year ago, you will think it a *Paradox* (if not *Heterodox*) and yet if fairly scan'd, what, I say, will not be found improbable.

For if we duely consider, how that which yesterday appear'd in the form of part of a Sheep, Calf, Ox, Deer, Pidgeon, Goose, Turkey, Corn, Herbs, Beer, &c. shall to

F 2

day

day be transmuted into Chyle, Blood, Flesh, Bones, &c. of a humane Body; yea, this to transpire within a few days, and assume other forms, and all this, by the power of Ferments, which are as the noble *Helmont* faith, the parents of Transmutation.

If the nutritive parts of our body was not in a constant flux, and always winding off, we should in time become *Anakites*, grow to be mighty Gyants: But from the vigour of the Ferments of the body, together with a perspirability communicated from the Air, the succulent, yea the solid parts themselves, are always upon the wing.

Thus as new parts are daily by a rotation of Ferments added, so the old as constantly march off, or wear away: or rather as the former texture of parts by a perspirability wind off, so new parts by fresh supply of Food (passing the circle of Ferments) are woven on: to confirm which, *viz.* that the Ferments wind off the old, and wind on the new coming parts of added Nutriment; appears by this Observation, that old Cows or Oxen, after they have done their expected service, being put to feed at fresh Grass, do by the power of the aforesaid Ferments, lay on new flesh, which eats as tenderly, as if the Goods had been kill'd young:

young : so that that which solely determines matter, in this grand circulation of bodys, out of one shape into another, are the seminal and specifical Ferments, and during the vigour of these the form of the body is kept intire in its specifical difference from other concrete bodys.

Wherefore the same specifical Body, after the revolution of some years, is no more the same numerical Body, than the Ship which went from *Athens*, and by frequent repairs return'd at last without one foot of old Timber, that it was at first built with, may be said to be the same.

Hydroph. But if so (*Pyroph.*) why do not we live always? Seeing as you say our Bodies are in a constant *fluor*, and as the old parts wear off, new ones come on; what should hinder, but they should always do so, and we live longer than *Mathusalem*?

Pyroph. To which I return (*Hydroph.*) that although our Bodies consist in a constant flux of Parts; and that nutrition is an apposition of new, in the place of the old, or transpiring Particles; yet as the form of this circulating matter is determin'd by the seminal, and therefore specifical Ferments; so the decaying of our Bodies, both by sickness and old Age, depend Essentially upon the intenseness and remissness of the vigour of those

Ferments : so that when these grow *languid* by diseases, the Body wasts by a *Marasmus* ; or when they at the long run of old Age, become infecbled, and draw towards their limit, according to the great and irrevocable decree of the Almighty, *Statutum est omnibus semel mori* ; then do they come to their *period*, as to their *Progressive* motion, (I mean in order to nourishment, and support of the Body thereby) and leaves the Body to be taken in pieces, either by a *Putredinous* Ferment, promoted by access of Air ; or by the *Fracedinous* odour of the Grave : whereby it's either transmitted into other Animals, (by the power of their Ferments) or reduced into its primitive Juice, or *Leffas* of the Earth ; For the strength, floridness, activity, and that which is commonly called the constitution of the Body, depends most what if not solely upon the vigour of the Ferments, as you may see further in our *Hydrologia Chymica*, and *Zymologia Physica*.

Hydroph. Well (*Pyroph.*) I have this yet to add against what you say, and that is to query ; why we should be troubled at any time with those sorts of diseases, we call *Chronical* ? For it should seem to me (if what you say concerning our bodies being in a perpetual flux of parts be true) that few diseases would be of any continuance, so as to acquire

quire the name of Chronical, because as the Body, so they also would wear off in time.

Pyroph. To which I answer, (*Hydroph.*) that as the Ferments are the *primary* active and *transmutative* Principles, to which the most incident *Phenomena* of diseases are chiefly reducible: so what alterations are made in the Body, by the *Ataxy* of Diseases are most what referrable thereto: so that Diseases happen not to the Body, as it falls under our consideration, in the notion of a constant flux, and vicissitude of parts; but as it is compos'd of a round of Ferments, whose exorbitances, prevarications, and frequent errors, become *Essential* to the begetting Diseases: And therefore although the Body as to its material constitutive Principles, may admit of a constant alteration of parts in an *Agil flux*, yet doth it not follow that Diseases are also as constantly worn off; because they belong to the Body as considered under its *Classis* of Ferments: so that as the Ferments in their vigour are the *Authors* of the *Entaxy* or due temperament of humors, and consequently of Health; in like manner their *spurious* exorbitances, are the essential causes of those disorders, and discomposures in the Body we call Diseases.

S E C T. XI.

Hydroph. **B**ut pray (*Pyroph.*) why did you in your discourse about the four Elements, being our suppos'd Original of all concrete Bodies, say, that they were too many to enter the composition of natural Bodies?

Pyroph. Because (*Hydroph.*) some of them, as for instance, the Air and Fire (the latter of which, as considered in its suppos'd Elementary Sphere *sub concavo lune*, or as culinary) concur not as constitutive Principles, to the making up of mixt Bodies.

Hydroph. Why is not Air in all, or most Bodies?

Pyroph. Yes, *Hydroph.* But not as a material Principle of Bodies, but with the *Æther* to fill up vacancies, and to do other Offices, in part below, but more fully illustrated in our *Tentamen Physiologic.*

Hydroph. Can either Animals live, or Vegetables grow without Air? Must it not therefore be an Essential Constitutive Element of Bodies?

Pyroph. I grant (*Hydroph.*) that neither Animals can live, nor Vegetables grow, without the confluence of Air, impregnate
with

with its *Nitro-Hermetick* Salt: and yet see no necessity, why it should thence follow, that Air should be an ingressive Principle of Bodies: For it may help to promote the vigour of the Ferments in Animals, by helping to Volatize the succulent parts, and make the blood circulate the better without *Stagnation* or spurious *Coagulations* in the Vessels; and yet may not at all be an Elemental Principle of Bodies.

Also it may concur to the promoting Vegetation of Plants, partly by impregnating the Nursery of Vegetables, the Earth, with a *Volatile nitrous* Salt, and partly (with its *Æther*) by setting the seminal Principles of Plants at work: for Earth (as we further enlarge in the *Appendix* to our *Hydrologia Chymica*) is not fertilized, nor brings forth Plants, without a concurrence of the fore-said Salt, nor are the seminal Ferments of Vegetables awakened, without the benevolence of the Air and its congenial *Æther*, saturated therewith, which constantly floats in the Air; as in its proper Sea.

Hydroph. But is not Air one parcel of which the Universe is made?

Pyroph. Yes.

Hydroph. And is not that matter a part of that whereof Concretes are made?

Pyroph. No, For although it be matter,

yet is it such a Texture thereof, as is only pliable, but not convertible into other Bodies, that is, never loseth the form of Air: for notwithstanding its Universal concurrence in the constitution of most Bodies as aforesaid, yet doth it never quit its genuine form, as we further shew in our *Tentamen Physiologic.*

Hydroph. But we define Air to be an Element moderately hot and most moist, filling every place that is not already repleat with another Body.

Pyroph. It is (*Hydroph.*) if I mistake not, neither hot nor moist of it self, and therefore can be no Element: for that which according to the *Peripatetick* Sense, makes it an Element, is the supposed combination of the qualities of Heat, and Moisture: by which it should seem, that moisture according to your Philosophy, was the Essential quality of Air, and by which Moisture, with a moderate heat, it should enter the composition of Bodies: Now if I make it good, that there is no moisture, but what is Essential to Water; then will your Element of Air cease to be such. You must know therefore (*Hydroph.*) that wherever you can find moisture, the *Pyrotechnick* Art will demonstrate it to be actually Water, and that either in a fluid Texture of parts, whereby it appears

appears even to the Sense, to be Water, or at least in an extended form, floating *vaporetus* in the tenuious and easily recessible Body of Air.

Whence it's evident, moisture is no quality at all ; from the aforesaid reason of its being really and essentially Water, either in a fluid or extended form ; as you may further see in our *Hydrologia Chymica*. So that moisture is only and primarily competent to the thin woven Texture of the parts of Water circulating in the Air, and to the Air but secondary, as the *Vehicle* of the extended Body of Water.

Hydroph. But is not the moisture which we see wets stone-walls, before Rain falls, that which properly belongs to the Air, yea, and the very Air transmuted into Water ?

Pyroph. I answer, no, for that is nothing but simple rarified Water, or the Body of Water extended in the perforations of the Air, which while interspers'd in the tenuious and pliable Body thereof, by the smallness of its rarified parts, escapes our Sense, and so remains till the parts thereof come nearer together, which gliding along the surface of Stones in Buildings (while the lower Region of the Air is ponderous therewith) becomes gathered into a visible Body of moisture or Water, and therefore is not
Air

Air transmuted into Water, as you may see more at large in our *Hydrologia Chymica*.

Hydroph. But pray (*Pyroph.*) seeing you neither admit of Air as the *subjectum inhesionis* of moisture, nor moisture to be a primary or essential quality of Air, and consequently deny Air to be an Element of Bodies, and that there is no transmutability of Air into Water: I say pray what do you suppose Air to be?

Pyroph. I look upon Air (*Hydroph.*) to be such a parcel of matter, whose parts consist in a *tenuous, diaphanous*, pliable and fluid Texture, of easie recess, susceptible of the impressions of the minutest of Bodies, and capable of permitting rarified Waters, Vapours and all sorts of *Apporrhæa* from the *terraqeous* Globe to pass and repass: of all which, and many other minute Bodies that fall not under the perception of our senses, it is the proper *Vehicle*, also subservient to the motion of all Bodies that tack to and fro within its Orb, is the *Vehicle* of Species; the *medium* of all influences and transactions betwixt the *Cæstial* and *Terrestrial* Bodies; And as *Trismegistus* in *Asclepio*, saith, *Aer est organum vel machina omnium, per quam omnia fiunt*, not as an Element, but as a Machine for the motion of all Bodies.

Its parts I say are *tenuious*, that it may the better give way to the motion of Bodies, within its *orbit*; of easie recess, that it may the better admit of other rarified Bodies, which are in a continual circulation, and those perforations to be of no prefixt figure, but either round, or angular, according to the pressure of its parts by the motion of other Bodies; *Diaphanous*, that it may the better transmit the Rays of luminous Bodies; *pliable*, I said, that it may be the more subservient to the jostlings of Bodies, and may the better recede upon the access of other moveables; and lastly, fluid, that it may thereby prevent any large *vacuum*, and may the better press into the *Porosities* of Bodies; Thus a stone being cast at a distance, which by the impulse it has got, draws, suppose, a straight line in the Air, forcing some parts of the Air, and those press upon the next adjacent, and those the next, till by a circulating motion they fall constantly into the rear of the deserted space, made by the motion of the stone, and so immediately supplies the vacancy thereof, and thereby contributes to the perpetuating the first impulse from a hand, Sling, or Engine; For if the Air did not constantly succeed by a circular motion, close in the rear of the moveable, the impulse would immediately
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flag, and the motion of the Body cease.

And although *Democritus* his two grand ingredients of the world were *Atoms*, and that which he calls *vacuum* or *inane*, which was nothing else but what we in the verge of our *Atmosphere* call Air, and above is *Æther*; yet certainly, although the parts of Air, are so *tenuous*, and *diaphanous*; as never to become visible to our eyes, yet I say, may no less be reputed matter, (in how different a Texture soever) than that which enters the composition of natural Bodies, as genuine Elements thereof.

Hydroph. These are general considerations of Air, as it falls in a large sense under our apprehension: But pray (*Pyroph.*) how do you apprehend of it in a more strict and particular sense, in order to the intimate concerns of Animals and Vegetables, which seem to have some near dependance thereon, both as to their Generation, Conservation in their Species, and *Metastasis* too.

Pyroph. Not so general considerations (*Hydroph.*) as you may perhaps take them to be, but may many of them very well serve to some *Phænomena* of both Animals, Vegetables and other Bodies, as they fall under a Philosophick inquiry; for that it should by its *tenuous*, plyable, fluid Texture, be subservient to the motion of Bodies, is thereby no less

less serviceable, as for the general so the particular concerns of Animals and Vegetables, both by concurring to the *Motion, Sensation, Secretion, and Perspiration* of Animals; as also by promoting the motion and Vegetation of Vegetables; and that too as it is perforable and diaphanous admitting both of luminous as well as other Bodies which circulate in its Orb, for the helping forward *Animation, and Vegetation*, and all this by invigorating the Essential Ferments of both, which its congenial associate the *Volatile nitrous Salt*, and *Ætherial* matter hid therein.

Without which, the functions of *Vitality* could not be perform'd, for without those jointly concurring, neither would the Ferments be actuated, the parts perspirable the Taper of Life set a flaming, nor in fine the Body moveable without the help of that *Organum*, as *Trismegistus* calls it: which is further evident by what improvements, the great Naturalist, Esq; Boyle, hath made in the lately invented *Pneumatick Engine*, into which if Animals be put, and the Air pumpt forth, they fall into Palpitations and in a very little time, for want of the help of this Essential *Organum*, the Ferments are damp'd, the Spirits run counter, flag, and the Taper of Life is quickly extinct, so that they speedily die of *Spasms* and *Convulsions*.

And

Philosophical Dialogues.

And as the Air with its *Volatile* Salt, is an Essential Machine (not as an Element) necessary to promote (if not also to excite) the Functions of Vitality in Animals; so it is no less effectual, in the invigorating the seminal Ferments of Vegetables: For neither are these brought on to maturity, nor do they grow without the concurrence thereof; Inasmuch as the superficies of the Earth, which is the Matrix or Nursery of Vegetable Seeds, is porous and spongy, whereby the Air has access to Seeds, even in their first openings, and beginnings to motion; concurring to the first workings, of the seminal Principles, by putting the Springs & Ferments into Action; and when they by the Vegetative Collision of their Principles put forth, or spring out of the Earth; still require the assisting influence of this fluid *Aereal* matter, of which if they be denied, their Ferments cease to act, and the Body withers.

And as to what you ask (*Hydrop.*) how the Air is concern'd in the *Metastasis* of Bodies, out of one shape into another; I answer, that new Ferments are super-induc'd upon Bodies, for the mutation thereof, by the mediation of Air, whereby the seminal Principles, which by their intestine and *Progressive* Collisions have been the Mechanical Agents in the Production and *Genesis* of Bodies.

dies, do now, by the *superinduction* of new Ferments, from the Air, fall into other sorts (I mean *Retrogressive*) Collisions, thereby takes the same Body (they built before) now in pieces by a putredinous Ferment;

For if some Bodies can but be secur'd from the Air (or from what is contain'd in the Air) before a putrid Ferment be introduc'd, (that is, before the Principles be put into their reverse motion,) they may be preserv'd intire in their form: the truth of which, may be confirm'd by several Mechanical instances: For besides the *Additaments* of *Salts*, *Sugars*, and *Vinegars*, wherewith many sorts of things, as food and all Confections may be preserv'd a considerable time for use: and besides the Occlusions of the Pores of some Bodies, especially *Pullen* and the like, killed and hung up in the Feathers, whereby those Bodies may be kept intire from putrefaction by the Frost Air, as they preserve their kill'd *Pullen* for several Months sweet and good, in *New-England*; I say, besides all these, I know a peculiar Artifice of preserving *Aprecocks*, *Damfens*, *Gooseberries*, *Cherries*, &c. without the addition of any thing, save a skilful contrivance of excluding the Air: of which more in our *Zymolog. Physic. and Tentamen Physiologic.*

Thus also Quinces by taking forth the Core
which.

which boyld with some other *Quinces* to a *Mucilage*, with which they are to be fill'd, and put into a close Vessel, fill'd round with the same *Mucilage*, will preserve them intire in their form for a whole year; so flesh kept in a constant current of Water, or in Spirit of Wine, will be preserv'd a long time in its intire form, as sometimes a Puppy has been kept intire, and *Embrio's* are preserved from any putrid Ferment in Spirit of Wine. Also Beef season'd and well bak'd, and put in a Cask fill'd with despum'd Butter, has thereby been kept good in long Voyages: Thus by imbalming, Fumes, and Searcloths, Cadaverous Bodies are kept a great while from putrefaction: also by a constant heat the same Bodies may be *Mummiz'd*, witness the Bodies both of Men and Beasts in sandy Deserts (as those of *Arabia*) being covered over with Sands by whirl-winds or Hurricanes, are by the heat of the Sun (constantly beating upon them) and by being separated from the Air, turn'd into *Mummy*, found unbar'd by other contrary Winds.

So that you see hence (*Hydroph.*) how Bodies are prevented of their otherwise sudden *Metastasis* into other shapes, either by additional *Saline* or other sorts of *Condiments* Liquors, Steams, &c. or other more solitary Exclusions of Air; all which do anticipate the

the sudden *Analysis* of Bodies, (which frequently happen from new putredinous Ferments) by arresting and suspending the Principles of Bodies in their *Fermentative* Collisions : wherefore you see that the Air is not only of general but particular concern, as in the production and conservation of Animals, and Vegetables, so also in the production or putredinous *Analysis* of them into other forms.

Besides all which (*Hydroph.*) we are to consider the Air as the common *Vehicle* of Heat, Cold, and Moisture, not as Qualities which are Essential to Air, as their *sub-jectum inhesionis*, but as actual Bodies, how minute soever, are capable enough to smite our subtile Organs, and affect our Senses, set on work by Winds from different quarters, which are the *Clavigeri tempestatum* in order to the mutation of weather.

For although these float in the Air and are not seen, (excepting that of Moisture gathered together in a Mist, Fog, or Cloud) yet that they are perceptible enough to our Senses, is evident amongst the rest, from the *minute Particles* of Cold, which float in the Air from Northern Winds, and are of such Shape, or Size, as they not only pierce our Skins, and moderately shut the Pores thereof, thereby invigorate the Ferments, whence
our

our Appetites to Food are stronger, and the Digestions the better perform'd in Frost than in warm Weather. And in colder Countries and Climates, than in hot, but in cold raw Weather the Pores (those small Portals of the Body) stand a char (if I may so say) whereby the alterations in the Air have the easier access into our Juices, to procure the like in them; whence we observe, in such Weather people generally take more cold, and are more prone to Diseases, as well Acute as Chronical, than at other Seasons.

Which Frost Air, if it be very sharp, congeals the fluid humours of our Bodies, forcing the Spirits to a retreat unless oppos'd by a warmth from exercise or Spirits of good Liquor, yea the same cold *Particles* meeting with Water, doth so fill the Pores thereof, that from a fluid, they (by their interposition) make it become for a time a kind of solid Body: which when the winds change, and are carried in different *Pericledi* of the Air, as breathing, suppose from the *South*, or *West*, *South-East*, or *South-West* points; the *Particles* of Heat and Moisture muster in the Air, and mortifie, dint or resolve the cold *Particles*.

For it's very probable that the congealing of Water into Ice by Cold, is nothing else but the congelation of the *Atoms* (which in
one

one Sense we admit) of Cold, rivetting themselves fast in the Pores of the Body of Water, in as much as these floating in the Air, either brought to us by those Winds which blow over the *Northern* Frozen Seas, which in their resolution may extricate themselves from their former combinations, being carried by the fanning of the Wind from that quarter, or from what other causes soever, meeting with liquid Bodies, by their piercing nature insinuate themselves into the Texture thereof, and as they weave themselves in, they put a stop to the motion or fluidity of those liquids, unless preserv'd by some active, nimble, spirituous parts, and from a fluid make them become (as we said) a sort of Solid Bodies; which as they fill some Pores of Water, so they cause some other parts of Water to constringe or concentrate themselves; whence is one reason, why in Frosty Seasons, Rivers (that are otherwise high by late falls of Rain) are upon Frosty Winds shrunk up, and Water in Vessels expos'd to the Air, are sensibly contracted or lessened.

Wherefore all Bodies whose Texture consists mostwhat of liquid parts, if they contain so many of those aforesaid nimble, *spirituous, fermentative Particles*, by the briskness of whose motion, the liquids are kept fluid, then

then are they secured (so long as kept either circulating in their own, or defended by close Vessels) from the injury of the cold, undergo no coagulation therefrom, nor are altered thereby; Thus the Blood, and liquid Juices in the Body of Man or other Animals, as long as they are invigorated with *Spirituous, Saline* and *Sulphureous* parts, which keep them constantly in a circulating Motion, so long are safe from the injury of cold: so all Fermented Liquors, whether *Wines, Sider, Perry, Ale, Beer*, &c. while the Ferments are active, with *Spirituous* parts interwoven in the whole Texture thereof, and kept in close Vessels, so long are not apt to be surpriz'd by cold, or to be congeal'd thereby into Ice: unless through the excessiveness of Cold, and perhaps carelessness in stopping up Vessels, Wines or other Fermented Liquors become Frozen, as sometimes happens upon very long Voyages into cold Climates, witness that of Fishing for *Whales*, by some *Hollanders* in the *Northern-Seas*, their Wines (otherwise generous enough) were by extremity of cold Frozen, the Hoops being taken off, and the Wines uncask'd, they were found congeal'd into Ice, and stood in the form of the Vessels they were put in: which Ice they perforated with Augers, and found about the Center of the Ice, a little Liquor
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of an *Ametyst* Colour, which was the pure *Balsamick* Spirits of Wine concentrated, and therefore incapable of being congeal'd by cold: all the rest of the Body of Ice, being dissolv'd by Heat, was an insipid Phlegm or mere *Water* of *Wine*, into which if a little of the true Fiery Spirits was pour'd, made it like *Wine*, after which manner they drank it.

And in our late intense Frost, *December* last, the *Particles* of Cold were so copious, and piercing, as it froze *Beer* and *Ale* in Cakes, *Sherry Sack* in Bottles, and a *Lixivium* of Vegetable Salts I had by me; yea a pretty smart Spirit of *Vitriol* standing in a Bottle in a *Window*, was as far as I could discern totally Frozen up: and in *York-shire* in some places, it froze the moisture in peoples Nostrils, into Icicles, that with their finger (as an Eye-witness told me) they pull'd out pieces of Ice.

So all *Volatile* Spirits, whether *Vinous*, *Urinous*, or *Oleaginous* are (being kept in close Vessels) capable of defending themselves from being congeal'd by cold. For neither Spirits of *Wine*, or *Volatile* Spirits of *Blood*, *Urin*, *Soot*, *Harts-horn*, &c. nor distill'd (therefore call'd) *Chymical-Oyls*, as of *Turpentine*, *Cinamon*, *Cloves*, *Rosemary*, *Sage*, *Wormwood*, &c. are I say none of them
apt

apt to be Frozen by Cold, but can defend themselves, by their nimble, active, spirituous parts, from the injury thereof: in like manner all Mineral acid Spirits, as of *Vitriol* (except, as aforesaid) *Alom*, *Nitre*, *Salt*, &c. can (if kept in close Vessels) preserve themselves from damage by cold: so also *Lixiviums* made of the fixt Salts of *Tartar*, or other Vegetables.

But those Liquids, that are destitute of saline, sulphurous, or other fermenting Particles, are of themselves capable of admitting the ingress of cold Atoms, so as to suffer some *Vacuolums* to be fill'd, and other parts to be constring'd into a solid form of the congeal'd body of Ice, and all this by the medium of Air: which is the vehicle of these cold Atoms.

SECT. XII.

Hydroph. **B**ut we say (*Pyroph.*) that cold is an active Quality, which doth congregare *homogenea* & *heterogenea*, and as such doth condense & congeal Water into Ice.

Pyroph. Those qualities (*Hydroph.*) together with the quaternary of Elements, which you look upon as Principles of mixt bodies, and from whose combinations, you would solve the different appearances thereof, I have told you, and I think partly demonstrated

strated, as such, not to be in *rerum natura*.

Hydroph. But what different impressions (*Pyroph.*) are made in the Air from cold Particles, and from Ferments of a contrary disposition, and what alterations thence happen to Animal Juyces, and how perform'd?

Pyroph. I answer, That as the Air by reason of some congeneal Ferments (tacking to and fro therein) doth conspire not only to the awakening the Ferments of Animals and Vegetables, and to the keeping them a foot, and that both in order to building of bodies, as well as to the pulling them down: so doth the Air at other seasons contain other Particles of cold, which are able to suspend the motion and action of the former, that is, if very intense, are able to destroy the Ferments of Men and other Animals, as is evident by the killing of many Men and Beasts in cold Countreys, as in *Russia, Greenland, and Norway*, the Frosts are sometimes so strong as that Men are sometimes brought to Inns or Markets frozen on Horse-back, are found rigid, and starv'd to death, sitting streight up like Statues; And in Vegetables it's very discernable to have them mortified by strong Frosts.

And as the cold Particles arrest the vital

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and vegetative Ferments of Animals and Vegetables, so it likewise suspends the putrefactive Ferments in the resolution, or taking bodies in pieces, locking up those resolving Ferments : hence the Carcases of any sort of Animals expos'd to the Air, having a putrefaction already begun, and thereby grown fætid, have, I say, upon strong Frosts, those putrid Ferments shut up, and send forth no *fætor*, or bad smell ; and that by reason of the cold Atoms, which fix themselves in the Pores of such bodys, and thereby arrest the motion of the Principles : which cold Particles are no sooner extricated by change of weather, but the Ferments, I mean the putrefactive, are let loose again, and then goes on as strongly as ever.

Yea, in thawing Winds, all putrefactive Ferments grow vigorous, and are carried in great and numerous swarms through the common Vehicle, the Air, which either smite our Nostrils very sensibly, or affect our Juices indiscernably to the producing great alterations therein : How much the frost Particles penetrate any Fruits, so much do they when the Frost breaks, undergo a putrefaction, as is obvious in Apples, and other Fruits, which the more they are expos'd to frost Air, so much the sooner they rot, and that because the active Principles
are

are so far mortify'd (through the openness of their Pores) as to their natural and intestine Fermentation, and so easily (upon the unhinging and unrivetting the cold Atoms,) fall into regressive and putrefactive Fermentation.

Hydroph. Have you (*Pyroph.*) any artificial way of representing cold to us?

Pyroph. Yes, how cold may be produc'd, we had an Experiment above 7 years ago, which was thus: Having mixed *Sal Armoniac*, and *Saturn Ore* upon a Marble, or in a Mortar, and put them into a subliming Urinal (for a peculiar purpose we then propos'd) to which adding Water, and shaking them together, while the solution was making produc'd an intense coldness to the hand holding the Glass, and washing the out-side of the Glass with water, found as it was pour'd on, immediately it became long fleaks of Ice, which as we took off and poured more water on, did the same again and again: the same will *Sal Armon.* dissolv'd *per se* in water do, also its *caput mort.* remaining after the sublimation thereof with *Pot-ash* or *Salt of Tartar*, dissolv'd in Water.

And to make two cold Liquors (cold to touch) to heat each other (to evince the reason of the contrary quality, *viz.* heat) we

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I have put Oyl of *Vitriol* to water, which being mixed by shaking, immediately contracts a greater heat than can be suffered by the hand that holds the Glass; and from the same cause, one may easily cause Ice it self to cause heat to another cold Liquor, by proceeding, as before, with Ice put in Oyl of *Vitriol*, as the worthy Experimentator, Mr. *Boyle*, tells us in his last Tract.

Hydroph. How do you (*Pyroph.*) suppose the freezing of Water to be resolv'd, or thaw'd? what becomes of those Atoms of cold, when a Frost is over? and what further Observations do you make of those Ferments in the Air upon thawing seasons, and sometimes in other weather?

Pyroph. To which I answer (*Hydroph.*) That as the Atoms of cold are brought to us through the Air by certain peculiar winds, which in their motion meeting with capable (*viz.* liquid watery) bodys, becomes coagulated therewith into that rigid body we call Ice; so there are other Atoms of heat which are brought at other seasons, through the same Vehicle of Air, by different (although to that purpose peculiar) winds, which in their motion, meeting with those of cold, either in the Air, or coagulated in watry bodies, resolve, mortifie (I mean alter their texture) and dint them
so

so, as either altering their texture, whereby they for a while swell, and flow together with the water (whence upon thaws, Rivers for a time grow bigger) till they can extricate themselves from the moist, and warm Particles, they are involv'd in; and by other winds are carryed into other places, to perform the same offices: or else do as some sorts of Salts do to others of a different texture, viz. one to mortifie (to use a Chymical term) dint, and change another, until there result a *neutrum*, or third thing different from either of the two.

Besides which, we are to consider (*Hydroph.*) that these mutually acting and working upon each other, beget new shapes amongst themselves, and many times prove subtile penetrating Ferments, which being carryed in the belly of the wind, insinuate into fermentative Liquors, and set them freshly a working, which we see frequently happen in thawing winds, that both Ale and Beer often ferment anew, yea Wines too, especially about the time of Vintage, when those fermentative Particles are arrested, and determin'd by vinous Atoms, which at that season take wing, and float in the Air.

The same also may cause strange, and different

ferent fermentations in the blood, and other Juices of our bodies, the efficient sometimes of Feavers, and other Endemical, yea Epidemical Diseases: and that these winds and changes of Air thereby have an odd influence upon the fluid Juices of our bodies, is apparent, in that vulgar, yet true Proverb, that some carry Almanacks in their bones, can discern the changes of weather before hand, which as we apprehend can be from no other cause, than that the minute Particles of heat, cold or moisture, or combinations thereof (carried by different winds in the Vehicle of the Air, from whence all varieties of weather do certainly follow, which, I say, at first, or afore-hand, mustering in an invisible manner in the Air) become Ferments, which rouse up old Aches, Pains, Asthma's, Heaviness, weakness of the Joynts, and other Symptoms vulgarly ascribable to the *Scurvey*, and and that many times before the weather be discernably chang'd, because these otherwise indiscernable alterations of weather, are prefigured, and transacted before hand in the Air.

Whence many times (as may be obvious to a curious eye) proceed the sudden and unexpected alterations of Symptoms in diseased and crasie bodies, which so much puzzle

puzzle Physicians to know whence such sudden changes, contrary to their expectation should happen; how well do things succeed, even according to their desire, and sometimes beyond their expectation at some peculiar juncture of time (attributed by Astrologers to I know not what configuration of the Planets) and on the other hand, how cross and thwarting to their hopes, things happen at other seasons; and all this many times from various excited Ferments in the Air, which work differently upon bodies, according to variety of constitutions, disposition of the Ferments, and modification of other parts.

So also from other alterations in the Air, by some winds, a verminous ferment is excited, as we see in the Spring time, when the winds breath long from the *East*, that many *Caterpillers*, and other Insects, are produc'd upon Trees, and Plants; and many times putredinous animated Ferments are brought with winds from cadaverous bodies, which floating in the Air, prove seminaries to contagious and verminous Diseases; whence the great Plague at *Milan*, at which time, as *Cardan* reports, the Air was filled, yea the very dust of the Earth animated with those contagious Vermicles; so that in the Air often lurk secret Ferments.

ments, which may both produce different symptoms in the same disease, as also be the cause of many *Epidemical* Diseases, whose Character (I mean of *Exotick* Ferments.) may for some time be in the Air, before they settle upon Bodies, so as to cause a general discomposure.

And from the same cause, very probably it is, that Animals which are frequently abroad in the Air, have a foresight or presensation of the alterations of Weather; (whence the ground of *Auguration* amongst the Ancients) for their Bodies, being always exposed to change of Air, in the variety of weather, become thereby in their Texture of parts, more capable of being affected, with the least changes of Air, in which are always the forerunners of certain alterations of weather, by the foresaid congress of the minute Particles of Heat, Cold, Moisture, and what else which give being (by different Winds from diverse quarters) to changes of weather.

Thus *Cranes* are observed by some Naturalists, that when they fly softly, and silently, do presage fair weather; but when they hasten, make a great noise, and fly in a disturbed order, do predict Storms; so likewise *Storks* and *Wild-Geese*, as *Wolfgangius* tells us in his *Historia animalium Sacra*; and there-

therefore *Storks* and *Cranes*, before the coming of Winter, take wing and fly in Troops in a triangular form into hotter Countries, witness from *Thracia* into *Egypt*; and from *Cilicia*, into *Persia*: [not to say what is reported, that when they fly near *Mount Taurus*, where store of *Eagles* are, they each take a stone in their Bill to prevent any noise, lest the *Eagles* should seize upon them.]

Not unlike to which the learned *Wormius* in his *Museum*, relates somewhat wonderful concerning a sort of Bird frequent in *Normay*, upon which change of weather has afore-hand strange influence; his words are as followeth, *Museum. Norm. p. 304. Aliud genus* (saith he) *Norvegiæ & Islandis frequens, est è Mergorum vel potius Colymborum genere, Nidum prope aquas ita struit, ut cum necessitas flagitat, in eas se celeriter præcipitare potest: sed nidum repetiturâ, infixo terræ rostro se suspendit, donec corpus sublevaverit, ac petium obtinuerit nidum; ubi imbres largiores imminere peculiari nature instinctu persentiscit, pullis ac nido suo ab inundatione metuens, querulo sono aerem verberat; è contra cum cæli serenitatem & clementiam præsagierit, lætis acclamationibus, & alio gratiori sono pullis applaudit, unde de futura tempestate certi accolæ, vocem Hui audientes exclamare solent Norvegi.*

SECT. XIII.

Hydroph. **W**Hat think you (*Pyroph.*) of the drying quality, which we define, *qualitas patibilis, quæ suo facile, alieno autem termino difficulter clauditur*: Is not this competible to the Earth *primarily*, and to the Air *secundarily*, and to other Bodies as they admit of the combination of this with other qualities, in the composition thereof.

Pyroph. I think (*Hydroph.*) and perhaps may make good, that what you call a drying quality, is no more a quality than its opposite moisture; and that as moisture is no quality *primarily* of the Air, nor *secundarily* of other Bodies in their Composition: so neither is driness, as a quality, either peculiar to the Earth, or to Compound Bodies: For in that a Body is said to be dry, is in as much as the parts which constitute it, are of another Texture than liquid, and are so woven together, as to have few (at least as discernable) fluid parts.

And those dry Bodies, are either naturally such, as for instance, some sorts of *Stones*, and some *Calces* of calcin'd Bodies, which by no force of Fire are ever reducible into
any

any liquid form: or else such Bodies, as while kept from force of Fire, are accounted dry, of which are all *Metals*, *Minerals*, *Metalline*, and *Mineral Ore*, some Stones, as *Peables*, *Flints*, *Sand*, *Ashes* of burnt or calcin'd Bodies, all which by stress of Fire may be made to melt and become fluid, some *per se*, as the *Metals* and some *Minerals*, others by addition of Salts, as some *Minerals*, also *Mineral* and *Metalline Ore*, *Pebbles*, *Flint*, *Sand*, &c. by the addition of Salt of *Kelp*, *Tartar*, or other calcin'd Vegetables melt into transparent Glass.

Thus the *Calx* of Metals fretted by Acids, and thereby reduc'd after Evaporation in *minima* (viz.) into their impapable *Alcolizate* pouders, are seemingly dry, yet these very subtile *Crocus's* of Metals; witness that of *Copper*, dissolv'd into, and incorporated in that Body we call *Verdigreece*, by the help of the sour Juice of *Grapes*, or in that which remains after the Vintage, if that be dry'd and beat to a most subtile pouders, (which by the motion of a Pestle or the like, presently by the *minuteness* of its parts, fly up, and doth *ferire nares* as also that of natural *Vitriol*) do I say both by stress of Fire arise in a considerable white fume, and condense into a plenty of liquid Spirits, as is evident in the Spirit of *Verdigreece*, of *Vitriol*; and so
most

most of other Bodies, which being divided into their *Minima*, so as to appear in a dry Sapless form, may yet by distillation be turn'd most what into liquids; or by reduction into their *Sulphurs* or *Mercuries* (if *Metalline* Bodies) be further convertible into the fluid Texture of parts.

VVherefore seeing dryness is no other than such a Texture of parts in the construction of Bodies, as renders the Concrete not easily fluid, nor apt to flow together, when the constitutive parts are rather *continuous* than *contiguous*: therefore must this dry quality, as well as the rest of the same fraternity, *ipso facto*, forfeit its supposed Essence of a quality, and lose its repute of a nothing, for so I esteem it, or little better, while under the notion of a quality.

Hence those degrees of qualities, which (*Hydroph.*) you in your Philosophy) and *Medicks* are apt to ascribe Concretes to, are no more to be taken notice of, than the qualities themselves: so that all your Solutions of apparences by your supposed degrees of the *Primary* qualities, will (what is said being premis'd) of their own accord fall to nothing. Hence for instance, *Iron*, which you in your *Scarb. Spaw*, repute to be of the third degree of driness, is no more to be taken notice of, as to a Philosophical Solution

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on of the Essence of that Concrete) than if you had said it had been in the third degree of nothing, for both are alike unintelligible; of which more particularly in our *Hydrological Essays*.

Hydroph. Well (*Pyroph.*) I might justly reply to you, as formerly, we in the Disputations of the Schools us'd to accost the *Cartesians*, viz. *Contra principia negantem non est disputandum*: These are new conceits, which we that are grown old in the Philosophy of *Aristotle* and his followers, are not at leisure to take notice of: But what will you make (*Pyroph.*) of the second qualities, viz. those we call *Density*, *Rarity*, *Gravity*, *Levity*, *Hardness*, *Softness*, *Thickness*, *Thinness*, *Aridity*, *Lubricity*, *Clamminess*, *Friableness*, *Asperity*, and *Smoothness*? Are not these necessarily to be reputed Qualities, by which we arrive to some knowledge of the nature of the Bodies they are found in?

Pyroph. As to which query (*Hydroph.*) concerning the second qualities, I answer, that as the first qualities, are not in *rerum natura*, as such, so neither are the second, for *sublata causa tollitur effectus*: But the first are the supposed cause of the second, which being (by reasons aforesaid) deducted out of the Catalogue of *Entities*, nothing of the second qualities, as such can remain.

For:

For that that Texture of parts which makes Bodies appear to our Senses, dense or rare, heavy or light, hard or soft, rugged or smooth, &c. should be reputed *Secondary*, depending upon the *quaternary* of the first qualities, *Heat, Cold, Driness, and Moisture*, is I say, as indemonstrable as unintelligible; for all these (as far as I apprehend) depend meerly upon the different Texture of the constitutive parts of Bodies, whereby they variously affect our Senses, yea and many of them competible to the same Body, as its parts are variously agitated by fire, Ferments, Salts or Solvents, whereby the same Body so differently acted, and its parts transpos'd, may very changeably affect our Senses, after so many different manners, as may make up all or most of those you call second qualities.

Hydroph. Is not rarity a second quality, arising chiefly from Heat, having its parts extenuated, as *Herbs, Pruine, Clouds*? And is not *Density* another from Cold, having its parts bound up, and solidly adhering to each other, as *Glass, Stone, Iron*, and the rest of the Metals? And further is not *Levity* a quality arising from Heat, making things capable of moving upwards; and *Gravity* a quality from Cold, which makes things move downwards towards a Center?

Pyroph. I answer (*Hydroph.*) that in
what

what you term *Rarity*, I see no necessity of giving the name of a second quality arising from the *Primary Heat*; but that it is only such a Texture of parts in the composition of some Bodies, as makes them appear thin, and as it were finely woven; being a rare Texture of parts, with many *Streiners*, *Porosities*, or *vacuolums* interspers'd, according to whose Fabrick of parts, our Senses are generally affected, so as they fall under such and such distinct perception thereof.

Thus *Air* is a rare Body, in as much as its parts are of a fine, thin, *tenuious* plyable Texture as aforesaid: And as *Rarity*, so *Density* is no quality, being no other than such a Body, whose parts are closely set together, with few *Porosities*, thus *Stone*, *Glass*, *Metalline*, and *Mineral-Bodies*, are such whose constitutive parts are closely bound up, and fast rivetted together; and therefore no need of ascribing its original to cold.

As for *Levity*, it is peculiar to such Bodies whose Texture is rare and finely woven, and so the sequel of that we call *Rarity*. Also *Gravity* is the contrary, being the necessary product of such Bodies, whose parts are closely put together, I mean of those which are compact and dense Bodies.

And as to the rest, of second qualities, as *Hardness*, *Softness*, *Thicknes*, *Thinness*, &c.
all

all which I say, are but different *Modifications* of the parts of Bodies, whereby they variously affect our Senses, having the same way of solution as those I have already spoken of, therefore shall forbear.

Now that these (*Hydroph.*) are neither the *Indexes* nor the *Products* of the *Quaternary* of first qualities, and consequently not to be reckoned (as such) in the *Category* of qualities, is evident, in that one and the same Body, by a *Metastasis* of its parts by Fire, Salts, or *Solvents*, may undergo all or most of those you call *second* and perhaps *first* qualities too: so that to which of these, the Essence of that Body should be attributed, would prove a *query* too difficult for most of your Philosophy grounded upon these qualities, to resolve.

Thus for instance, suppose we take *Antimony* into our consideration, which in its *Min. ra.* is a stony, dense, heavy, hard, friable Body; this being melted by Fire, and thereby separated from its *petrifique*, gritty, and *fabulous* parts, gives us that Body of *Antimony* usually sold in the Shops; which still retains all the aforesaid properties, which are the natural *sequels* of its present Texture of parts; But suppose this by fire be forc'd. in Fumes into Flowers, adhering to the sides of Pots, Ovens, or other large receivers, give

give a rare, light, soft and impalpable Body, with a white colour; which fluxed by further addition of Fire, becomes a dense, heavy, hard, friable but *diaphanous* Body called the *Vitrum* or Glass of *Antimony*, where by the *Vitrification* of its parts, it emulates that other product of the Fire made from Ashes and Sand flux'd together: [Concerning the reasons and causes of *Vitrification* in general and particular, we discourse in our *Tentamen Physiologic.* and *Litholog. Physica.*]

This glass prepared as aforesaid, will by further addition of Fire and Salts, become *Metalline*, melt and run into a *Regulus*, which melts and flows like *Lead* or *Quick-silver*, (call'd by *Chymists* the coagulated *Mercury* of *Antimony*) is dense, hard, heavy, and *opaque*, which again may be sublim'd into Flowers, out of which Flowers may a current *Mercury* begot by boyling with Salt of *Tartar*, &c. as is mention'd in Volum. 4. *Theat. Chym. Nova disquisit. de Helia Artista.*

Also *Antimony* by addition of Salts with the help of Fire, produceth that Mass we call *hepar Antimonii*, (which makes the frequently us'd *Emetick* Wine) upon which dissolv'd in Water, if distill'd *Vinegar* be poured, it makes a speedy separation of a Red and Yellow *Sulphur*, with a *Fetid Sulphureous*.

phureous smell very like the Water of the *Sulphur-Well* at *Knarsborough* in *York-shire*: But if in lieu of *Vinegar*, more Salts be added, and it be further calcin'd, it turns from a yellow to a *Carnation*, then to a white Colour, which when *edulcorated* by washing the Salts therefrom, becomes that Body we call *Diaphoretick Antimony*, being a white (with yellow reflection) soft, impalpable powder.

In like manner, *Antimony* calcin'd with *Aqua-fortis*, either becomes white, or by another addition thereto, with a slight *Artifice* is turn'd into a green *Sulphur* which flames, and has all the properties of common *Brimstone*: So *Antimony* with the addition of *Mercury sublimat*e, is by the help of the Salts therein contain'd, brought into a *glacial Oyl*, which as it becomes a fluid Body by the least Heat, so it is congeal'd into *Crystals* frequently by Cold: if upon this *Oyl*, warm Water, or *Oyl* of *Tartar* be poured, precipitates into a soft powder, call'd *Mercurius Vite*: if Spirit of *Nitre* or *Aqua-fortis* be distill'd therefrom, it becomes (after the passing away of a stifling *Sulphureous Arsenical Fume*) another soft, white, impalpable powder, call'd *Bezoadicum Minerale*.

Thus you see (*Hydroph.*) how the same Body of *Antimony*, is by the various application

tion of Fire, and Salts, so altered in the Texture of its parts, as to give that variety of apparences under which it arrives differently disguis'd to our Senses, viz. as that which appears dense, heavy, hard, of one colour, &c. shall presently discover it self to be rare, light, soft, of another colour, &c. and which even now appear'd solid, and permanent, shall forthwith become soft, and fluid; where it will be difficult to judge truly of the nature of this *Mineral Concrete* by the present prevalency of any of these *secondary* qualities.

Yea and further to acquaint you, what great alterations and changes may be made in the same Body, by the transposition and sometimes *volatization* of the parts, through the mediation of Fire and *Solvents*, I know by a certain method, how to make *Antimony* (the Body we urge for instance) as solid a Concrete as it is, arise over the Helm in an easie Heat, and in the form of a Liquor, and by which sometimes I have known it come into the Helm, even in the gentle heat of *Balneum Mariæ*, in the form not only of a limpid liquor, but also sometimes of a Salt dissolvable *per deliquium* into an Oyl, easily discernable by its lactescence and precipitation by the bare addition of simple water.

I might (*Hydroph.*) confirm this by further instances of the like nature, viz. by urging the various *Phænomena's* of *Vitriol*, *Copper* and other Metals, whose different transposition of parts by Fire, Salts, and Solvents, make up the great variety of those necessary sequels of Bodies, which you term *Qualities*, whether *primary* or *secondary*; and yet are really no other, than the different mutation of the constitutive parts of Bodies, out of one Posture, and Figure into another: whereby the same Body differently smites our senses with those mechanical Affections of matter, which (*Hydroph.*) you ascribe to the first and second qualities: For the further illustrating of which, you may consult the works of that worthy and incomparable Philosopher and industrious searcher of Nature, the Honourable Boyle, especially his *Treatise of the Origin of Forms*.

But before we conclude this Section, give me leave (*Hydroph.*) to acquaint you, that amongst other Instances, we have and might urge, how that from Metals by the mediation of Salts, and help of Fire, may result other sorts of concretions than usually appear, by different modifications mask'd with various qualifications: So that Mineral-gums (if I may so call them) may hence be made, which are much different

rent both in colour, capacity of taking flame, fusibility like water, &c. from any of the ingredients that enter the composition thereof: Thus for instance, from *Sal Armoniack*, *Mercury sublimate*, and *cap. Mort. of Verdegreece* (left after the distillation of its Spirit) mixed and put in a subliming Urinal, after it fluxed together (for it boyls like water) for five or six hours, when cool, I found in the bottom a Cake of a kind of *Rosin*, very hard, somewhat red, almost like *Gum gutta*; the *sublimate* which arose, was but very thin and inconsiderable, which *Rosin* would take Fire, and burn with a blue Flame, and that chiefly from the Sulphur of the Copper, which is opened by the Salts. And not only Art, but Nature her self exhibits us the various *Phænomena* of Water, under the disguise of Frost, Snow, Hail, &c. where for instance, in Snow the otherwise liquid, fluid, ponderous and transparent Body of Water, by the interposition of Frost or cold Atoms blowing from the *North*, becomes (by having the Texture of its parts so altered) as so many Flats or Planes, laid with layers of cold Particles *stratum superstratum* (as I may not improperly say) a white, soft, light, opaque, continuous and (unless it meet with heat) dry body so that you plainly see (*Hydroph.*) how humidity, siccity, fluidity, continuity, ponderousness,

ness, levity, transparency and opacity, and in particular whiteness is competent to the same Body, whose parts are variously altered and transposed *per se*, or with additionals.

SECT. XIV.

Hydroph. **B**UT are there not (*Pyroph.*) other qualities of Bodies whereby they become the Objects of the Senses, as Colours, Sapours, Odours, &c. To begin with the first, do not we rightly define colour to be *extremitas perspicui in corpore terminato*?

Pyroph. Those you reckon (*Hydroph.*) are no more to be accounted Qualities, than the rest beforenamed: But are to be look'd upon as different affections of Concrete Bodies, as they stand in a relation to a perception by our senses; and first as to the definition of colour, whose *genus* is *extremitas*, methinks *Aristotle* began at the wrong end; For it is not the extremity of a Diaphanous Body which gives Essence to colour, being only necessary thereto *à Posteriori*: For if I mistake not, light should be the *genus* of the definition of colour which admitting of various refractions and reflections, in, and from the extremities or surfaces of Bodies, make those dif-

different appearances thereof we call colours.

Besides, it should seem to me, that what you call *extremitas perspicui*, is not of that extent as to comprise the generality of colours, although we should admit of it as the *genus*; and that because we see colours as frequently made, by simple reflections of light from the surfaces of bodies, witness from all Vegetables, Animals, stain'd or dy'd Garments and the rest, as well (I say) as by refractions of the same light (the efficient of all colours) in perspicuous bodies: For that colour should be confin'd to the only extremity of a *diaphanous* body, is methinks too strait every way, both as to the *genus*, as also to the specific difference of the true definition of colour; in as much as where a *diaphanous* body proves opaque, the luminous Rayes which before were refracted, do now become terminated and reflected, and yet doth no less produce variety of colours than before.

As for instance, Suppose a Solution of *Vitriol* made in distill'd Water, which is a perspicuous body, giving a green colour, and that as well by refraction as transmission of Rays from a luminous body, gliding side-ways, and smiting through the Liquor, which renders it *diaphanous*; whose texture

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ture of parts with the interstices in the fluid *Menstruum*, causeth (I say) such a refraction of light, as thereby represents it under the form of a green colour. If into this green diaphanous Liquor (*Hydroph.*) you pour a clear solution of Galls, the texture of the vitriolin parts in the water will become so altered, as that in lieu of a *diaphanous*, it will become an opaque Liquor; so that the luminous Rays which before were refracted and transmitted, will now become either reflected or so intangled in the texture of the parts, as neither to make a transmission, refraction, or any considerable reflection of light there-from, and therefore becomes opacous or black.

For by the addition of Galls to the aforesaid Liquor, the first body, whose parts were uniform and regularly transmitted and refracted, the Rays of light, doth now by this commixture with the Particles of Galls, muster in so confus'd a posture, make an extraversion of large flats, some of which always fall in the rear of the Angles, and junctures of others; so as the transmission of light is quite intercepted, and therefore what reflection is made, is only so much as to be sufficient to make that representation of bodies by that colour we call black.

Which

Which that it is so, appears further by pouring Oyl of *Vitriol*, Spirit of *Nitre*, *Aqua-fortis*, or the like corrosive Acid Spirits upon those vitriolin opacous Liquors, or other bodies made black by vitriolin astringent Steins; where you will presently view those Particles of the Gall, which before fill'd the Pores of the Liquor, and by extraverting many flats made the Liquor opacous, dark, and inky, will now become fretted, dissolv'd, and the flats lessened, so as the parts will again return into their former uniform posture, and suffer the light (by becoming clear) to be transmitted as before, so to become a diaphanous Liquor, as at first: as you may further see in our Experiments about the change of Colours in Spaw Water, in our *Hydrolog. Chymica*.

And that colours are nothing else but different refractions and repercussions of light from bodies, according to various Angles of incidence and reflection from the different texture of the depth or superficies thereof, carryed through the transparent Tunicles and Humours of the Eyes, as through so many Glasses (for from the natural Fabric of the Eye are artificial optical or microscopical Glasses contriv'd) vibrating after a various manner the Optic

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Nerves

Nerves, so as to make that kind of sensation we call Vision: That colours are, I say, nothing else but such, I might confirm by many more instances (*viz.*) by the frequent Manuals of *Dyers, Tanners, Painters, &c.* in their colouring *Garments, Leather, Wood, &c.* by actual bodies (not qualities) of *Vitriol, Alum, Argol, Indico, Madder, Lime, Oak Bark, Minium, Ceruss, Verdigreece, Spanish-white, Gum, Vernice, ultra-Marine, &c.* all which produce different colours, not from inherent qualities in those bodies, arising from a legitimate contemperature of the four Elements, but represent themselves as being actual bodies; I mean, shew that great variety of colours by the different texture of their constitutive parts, whereby light becomes so differently refracted or reflected, as to be sufficient to cause that great variety of colours, we see amongst bodies: where we might from the aforesaid different reflections and refractions of light shew amongst the causes of those appearances we call colours, what for instance white is, and how made, which we suppose to be no other than that texture of parts which results from many superficies, flat, or spherical born up at some little distances from each other, by one or more of these following causes: *viz.* 1. By Air; 2. Atoms of Cold;

Cold ; 3. Other familiar inter-woven bodies; 4. Or lastly, are wrought into such a texture of parts by the preparatory Vessels. First by Air, as is evident in Torrents, great falls, and other agitations of Waters, in the white froth of Ale, Beer, or other fermenting Liquors, also in the warming of Ale or Beer, &c. where the Particles of Water and fermentative Liquors are hufft up with those of Air, being thereby reduc'd into globular Bubbles, the aggregation of which give us that Phænomenon of white observable therein: the like may be reckoned upon in production of white Oyntments from the concussion of Oyls, &c. Secondly, or by Atoms of cold, as is evident in the obvious Phænomenon of Snow : where, from the cold Atoms woven in, with, and between the flats (for such are the figure of its parts under this disguise) of watery Particles, results that colour of white, as also other appearances compitible to water under the Masque of Snow. Thirdly, Or by other inter-weaving bodies, as is evident where the texture of bodies are such as are made up of many superficies each upon other, by a natural *stratum super stratum*, born up by some other interposing parts, as is evident in natural Concretions, viz. *Talk, Alabaster, Bones, Horns, Plumes, &c.*

In factitious, viz. *Luna Cornea*, *Venice-glass* pulveriz'd, *Ceruss*, *Paper*, &c. In all which the light from the aforesaid texture of parts is so refracted and reflected as to exhibit us that apparence of white in all such bodies. Or lastly, are wrought into such a texture of parts by preparatory Vessels, by which in Animals, I mean the *Lacteals*, and *Glandules*, whence the whiteness of Milk, and by other Analogous in Vegetables, whence the milky Juices of all sorts of *Spurges*, *Cardus Marie*, &c.

But to demonstrate further, that Colour (and in particular White) is no other than the result of such a peculiar texture of bodies, as reflects the light after such a mode competent to that apparence: and that the same body undergoing no other change of any additional, but barely a transposition of the parts of the active Principles therein contained, was spontaneously reducible to its pristine clarity and transparency, I had this following *Phænomenon* represented to me in an Experiment I was then trying; In which Experiment, I shall forbear to name one of the constituent Liquors, in as much as in the main it relates not to this place, and only reckon upon the (to our purpose) pertinent *Phænomenon* which was this; I having two transparent Li-
quors

quors by me, one was rectified Spirit of Wine, the other a Mineral Liquor, upon the mixing these, I had (besides the gentle heat caus'd from a moderate fermentation of the Principles) forthwith the appearance of a Milk-white Liquor, through the whole body of the mixture, which (and what was very curious and remarkable to behold) within a very few minutes without any extrinsic addition, was spontaneously reduc'd to a transparent Liquor, as limpid almost as either of the Liquors was before mixture: and all this (which yet adds to admiration) without the least precipitation, or any sort of sediment what ever.

I might further enlarge (*Hydroph.*) but that I pretend not here to give a Body of Philosophy, therefore shall designedly contract.

Hydroph. Well, but seeing (*Pyroph.*) we have been discoursing of Colours, and that you say light is essential in the Fabric thereof, Pray what do you think of Light it self; do not we rightly define it to be *actus perspicui quatenus est perspicuum*, and do not we truly distinguish betwixt *lux* and *lumen*, in that we say, *lux est lucidi corporis qualitas*, being a quality of a luminous body as it abides, and is fixt in the lucid body; as for instance, that light which is in the Sun, Stars, or Fire,

while it is in those bodies we call it *lux*, but when it is dispers'd in a perspicuous body, as the Air, then it is properly *lumen*; and that in Fire the *lux*, or quality thereof sendeth forth that we call *lumen*, which illuminates the body of Air, and thereby makes it perspicuous.

Pyroph. To which *Hydroph.* I answer, That your definition of *lumen* to be the act of a perspicuous body as it is perspicuous, and your distinction of *lux* and *lumen*, are all too short (in my apprehension) of the essence of a lucid or luminous body, and that because what you call *actus perspicui* (as you define *lumen*) is no more according to your own Hypothesis than a product of a quality, or a quality of a quality: For it is (you say) produc'd from that you call *lux*, and this, you say, is a quality of a lucid body; so that *lumen* must be the product of *lux*, a quality of its quality, and by consequence one quality must be the subject of another, and why not of a third, *viz.* splendour, and so a fourth, and so *ad infinitum*.

Nay further, to suppose light to be a quality of a lucid body, as it abides and is fixt in that body, and yet that this should produce that you call *lumen* in another body, which it has or can have no essential dependence

dence upon, is to admit of qualities without the predicate of a subject, which according to your own Doctrine is absurd enough.

Hydroph. But what think you (*Pyroph.*) of the *genus* of light, is it a substance or body, or is it not rather a quality, or *quid incorporeum*? That it is not a corporeal substance, we have several Arguments to urge; as first, If it were a body, it could not so suddenly be diffus'd through the whole Hemisphere, and that by reason of resistance of the *medium*. Next to that it would suppose a penetration of bodies, and that because there is no part of a perspicuous body, as of Water, and Air, but is illuminated thereby. And lastly, if light was a body, so would also darkness be, because contraries.

Pyroph. These are indeed (*Hydroph.*) the main Arguments of *Aristotle* and his followers against the corporeality of Light, which we shall easily impugn. As to the first therefore we say, that it is not so difficult to apprehend that an essential luminous body (such I mean whose light springs from the evibrations of the intestine Fermentation (of its kind) of its intrinsic Principles, that is, whose light is from it self and not from another) should upon its exten-

Give motion, immediately reach to the periphery of its Orbs activity, then that it should perform that work of illumination by an imaginary quality of a quality, by a *lumen*, which has its being from a quality of a lucid body. As to the resistency of such mediums (the constitution of whose parts by its teniousness and facil recess, render them diaphanous upon the access of the Rays of light) is no more an obstacle to the speedy diffusion of the body of light, than the Air doth resist the explosive motion of Gun-powder, or than the Air doth oppose the activity of Fire within its own Orb.

And therefore (*Hydroph.*) we might better (and I think more agreeable to its nature) define Light to be a quick Evibration or extensive and (of its kind) fermentative motion of the intrinsic Principles of lucid bodies, stretching its nimble corporeal Rays from its self as the center to the periphery of its Orbs activity: a quick Vibration, and extensive Motion, I said, because that adds to the quickness of its transmission through a proper medium: For we see that one spark of Fire, or fired matter, mov'd suddenly in a round, makes an apparition of a whole circle of Fire, which suppose it were a *Radius*, or a Ray of Fire
whirl'd

whirl'd suddenly about its own center, would immediately appear as a whole sphere of Fire, and that meerly from the quickness of its motion, which seemingly makes Fire or Light appear much more than really it is.

So that we can no sooner consider a lucid body in motion, that is, its Principles or parts in an intestine collision or fermentative extrusion, but at the same instant we must apprehend it extended, and that extension is terminated by the utmost circle of its activity: in so much as supposing a luminous body mov'd, and extended, as aforesaid, is it self but the center to the whole Orb of its light, whose Rays probably, in their extensive motion are globular bodies, whirl'd about their own *Axis*, which very Orb may not improperly be call'd the Luminary: unless we take in another notion of the co-existency of fiery Particles: (*liquidi simul ignis*, the liquid Fire, as *Virgil* speaks, in his *Eglog.* to *Sileno*) interspers'd in the depth of the great Sphere, which becomes enkindled, and takes flame upon the access of the Rays of the great Luminary, the Sun.

Whether way we please to take it, amounts to the same thing: For whether we consider, suppose the Sun as the great

Luminary in Motion, extending its Rays instantaneously to the greatest circle of its lucid Orb reaching from it self round to the supposed *Vortices* of the otherwise conceiv'd fixt Stars, and illuminates the whole Orb save the shades of the opaque bodies, the Earth, Moon, and other Planets, which in their motion about it have always some parts shaded (which is that we call Darkness) which, I say, whether we consider the solar Luminary, that great fountain and treasure of light, mov'd, extended, and thereby filling its whole Orb (the shades excepted) even to the periphery thereof, with corporeal Rays through the whole medium of the vast *Expansum*, is the same as to apprehend a liquid Fire, or fiery Principle interspers'd in the whole depth of the Fabric of the World, which upon the access of its Compeer, the Rays of light immediately darted from the Sun, or mediately reflected from other bodies, joyns issue therewith, takes Flame, and together by the agil Motion of their parts, compose one great luminous Orb.

So that motion, and consequently extension is proper to both, making (either way) light to diffuse it self speedily through our Hemisphere: For whether it be darted immediately from the Luminary, and so fill
up

up the whole Orb of light, or it meeting with congenial fire or sulphureous Particles floating in the great deep, giving flame to one part after another, till the whole become illuminated, may be conceiv'd readily performable by motion: For a few fire Particles put into a vibrating agill *Flour*, or into a rapid collision makes a great light, and spreads far in a medium, whose texture of parts makes no interruption in the transmission thereof.

To assign a precise figure to the Corpuscles of light, is too curious, and perhaps hazardous of incurring a contradiction: For to say with the *Democritans* that fire Atoms are of a pyramid form, implies me-thinks a tacit contradiction both in *Mathematicks*, as well as in *Physicks*; For according to their Doctrine, Atoms) even as the word it self) implies indivisibility; which that these minute Particles should be indivisible, and yet Pyramid-wise is to me very strange, for being they are bodies, and these bodies Pyramids, must of necessity be solid Pyramids: now that such which are always made up of Lines, Superficiés, and Profundities (the natural sequels of Solids) should notwithstanding all this be supposed indivisible, is certainly indemonstrable.

Although indeed if we might imagine
with

with the *Cartesians*, the Globular Figure seems to be the most congenial to the nature & *Phænomena* of Light, as being of all Figures the most apt to be moved, and most capable of being reflected by its hitting against other Bodies; and that because the globular in their incidence upon other Bodies, of what figure soever; (saving such as are concave in their Texture,) do always touch *in puncto*, which makes them so apt to recoil, and make Angles of reflection answerable to those of incidence: and yet to determine a precise figuration of Atoms, as such, wants not its absurdity, as we elsewhere in our *Tentamen Physiolog.* take an opportunity further to enlarge.

These being premised, you see (*Hydaoph.*) it proves not difficult to assign the cause, why the Rays of Light though corporeal, should so readily and instantaneously be transmitted through the Hemisphere, or rather through the whole Sphere, (excepting as aforesaid the shades of the Earth and other Planets) as to make that Light we see in the World, notwithstanding the immenseness of the vast *medium* it wades through, the *radius* of which Circle, is both in relation to its self as also to its Circle, incommensurable, whose motion is always in right lines, unless intercepted by the interpositions of opaque Bodies.

Your

Your next Argument (*Hydroph.*) of the Penetration of Bodies upon the supposition of the corporealness of Light, grounded upon the general perspicuity of illuminated Bodies, will not be uneasy to refute, and that because the bodys of perspicuous mediums are, therefore diaphanous, in that they are tenuious, & pliable and thereby easily, and readily give way to the transmission of the nimble corporeal Rays of Light, which upon that account pervade the tenuious Texture of such mediums even *in oculi*; and yet these Rays if compared with other minute Bodies floating in the Atmosphere, are not altogether so numerous, as we are apt commonly to apprehend: For although to our eye plac'd in any point of the diaphanous medium, upon the extension of the Body of Light we see the Air totally illuminated, as if it were nothing else but Light, yet if we consider the largeness of the Texture of our Eye, and the proportionableness of an object to render it capable of affecting thereof, we shall find that it will require the mustering of a great many of minute Bodies, to make up the least sensible Object: so that the Texture of the eye is so fram'd by glassy humours, as to concenter the largely dilated Rays of Light, That thereby it may become serviceable to the transmission of *Species*.

For

For the *tunica uvea* of the Eye being perforated and defended by the transparent Tunicles call'd *Cornea*, & *adnata*, are supposed as a plain Glass or *foramen* in a dark Room, through which the sensible *Species* of Objects, are by the help of Light transmitted, but yet so as they appear only inverted: Therefore that these Images (*ειδωλα*) of things which float within their Orbs, may appear in their proper form, is required the help of the Crystalline humour, which is lenticular & convex, inserted into the vitrious humour as a *Gem* in a Ring whereby together with the help of the, albuginous humor, (which is to dint & shade the *Species* of things with their accompanied Light, lest it should come too strongly upon the Crystalline convex humor) the *Species* that were inverted in the *tunica uvea* might be revers'd, and put into their due posture in the convex Glass of the Crystalline humour, like as the inverted *Species* transmitted through a plane Glass or *foramen* into a dark room, are reversed by the help of a Tube, with a convex Glass in it, which thereby represents the *Species* of Objects at a great distance upon the opposite white Wall, or Paper, in their due and regular order; as for Recreation sake, we sometimes have seen: For the most of the Dioptricks are chiefly grounded upon the Texture of
the

the natural frame of the Eye.

So that it is by these Glasses (that I may so call them) of the Eye, that the distant Rays of Light become concentred, to make a sensible impression there; whereby the Air seems to us to be so totally diaphanous, as if there was nothing else but Light, when indeed it needs a Collection of its Rays by so skilful a contrivance as the Fabrick of the Organ of the Eye, to make it sensible.

Wherefore it is very apparent, that notwithstanding the corporeality of the Rays of Light, there is no necessity of the consequence of the penetration of Bodies both because of the distance of the Rays of Light, as also of the tenuiousness and pliable fluidness of the medium.

As to your last Argument (*Hydroph.*) viz. that if Light was a Body, so also would darkness be, because contraries; for the consequence of which I see no reason at all: & that because darkness is nothing else but the interception of Light, which is further manifest in that at the same time that the lucid Body of the *Sun* or other luminous Body is in motion, (I mean by its emission of Rays extended) at the very same time is darkness made by the shades of opaque Bodies.

For the radius of the Sun-beams extend far beyond the shaded, and therefore dark
cones.

cones of the Earth, and other Planetary Bodies: so that in the shade there is darkness, because Light is intercepted by an opaque Body; but beyond the shaded cone, the Rays become further continued, even to the very circumference of its vast luminous Orb: and so the like of any other lucid Body: for if a Candle be plac'd at a competent distance from a Globe in a large Room; so far as the Conical shade of the Globe reacheth, so far it is dark, but beyond that, the Rays are again continued even to the extent of its Orb's activity, if nothing interrupt.

And now (*Hydroph.*) having overturn'd your Arguments against, let me give you one (for all) for the corporeality of Light: and that is thus (*viz.*) that which may be mov'd, percuss'd, or reflected, is a Body; But such is Light, *Ergo.* The Major is apparent, both because qualities cannot undergo a loco-motion; but as considered in their *subiectum inhesionis*; nor can they admit of percussion or reflection; as also because these are only proper and peculiar to Bodies; for two Bodies mov'd towards each other, with a force, or one Body hitting upon another at rest, must recoil in one Angle, or other, and that necessarily, because Bodies.

That the minor is true, all the Rules of
Dioptricks

Dioptricks evince, besides we see that the Rays of the Sun smiting against the dense Body of the Earth, and becoming reflected therefrom, gives us that heat of Weather, we usually have in *June, July, and August*: also the dispers'd Rays of Light being collected by burning Glasses, do concenter in a fiery Cone, which actually gives a flame to combustible things: Hence it was that *Archimedes*, as by some mechanical Engines he shattered, and sunk, so by some Glasses artificially contriv'd, and suitably plac'd, he fired the Ships at a great distance, that besieged *Syracuse*: yea, and by the same Light of the Sun concentered, may (for ought we know) this Ball of the Earth be calcin'd into its primitive Embers, and may perhaps be vitrified too at the last into a Crystalline transparency.

SECT. XV.

Hydroph. **W**ELL (*Pyroph.*) but what think you of Sapours? Is not Sapour a quality of a mixt Body, arising by Heat, from an earthy dryness, contemper'd with a watery moisture? these no more than odours are substances or Bodies, but qualities, which are in Bodies, *tanquam in subiecto.*
Pyroph.

Pyroph. I think (*Hydroph.*) that Sapour is no quality of a mixt Body, arising from any contemperature thereof, but consists only in a relation betwixt our food, &c. and our Palat; is that whereby our aliment becomes sapid as I may say, and indicates a consonance or dissonance betwixt Concretes, and our gust or Palat; doth not consist as the Chymists will have it solely in the Saline Principle of things, although I must confess it much-what depends thereon: But it is either from the predominancy of the Saline or from a commixture of that with the Sulphureous parts of the Concrete, which together make up that we call Sapour in Concretes: for one or both these upon chewing being dissolv'd (at least some portion thereof) in the *Saliva*, presently thereby insinuates into the pores of the Tongue and Palat, and so affects that Sense we call Taste, and this by the different Textures and combinations of Salt, and Sulphur, in all palatable or saporous Bodies.

The Organ of that Sense is situated chiefly in that Membrane which like a neb over-spreads the Palat, Tongue, *Larinx*, & *ſophagus*, and is in common with that of the Stomach: whence it is that some disgustful things only tasted, do irritate the Stomach to that convulsive motion we call Vomiting: For Sa-

pours

pours are no otherwise than as Concretes stand related to that Sense of which they are the proper objects, being no qualities inherent in Bodies, nor are to be found in Bodies as they consist of the quaternary of Elements: and therefore are no results either of a *terrestrial* dryness, or watery moisture, nor from the combination thereof.

And if I should acquaint you (*Hydroph.*) with my thought herein, I might not let to tell you, that I apprehend (and see nothing in the Peripatetick Philosophy of validity to contradict) that the essential difference of the tast of Bodies upon the same Organical sense, doth consist in a due proportion and just adaptation of the sensible to the sense, I mean that as the Textures of Bodies are various, having different complications of their Saline and Sulphureous parts, so they accordingly do differently affect that sense, having some parts by mastication (chewing) dissolv'd in the *Saliva*, (brought thither by *Glandules*, and *Lymphiducts*) which by different Texture of their constitutive parts, variously smite and affect the sensible Membrane, which as those dissolv'd parts in the *Saliva*, become more or less proportionable to the Pores of the sensative Organ, so do those affections of Bodies we call Tasts, prove grateful or ungrateful, thereby variously affecting

fecting the Sense with those tastes we call sweet, bitter, sharp, sour, salt, astringent; austere and the rest, (if there be any more.)

Hydroph. But are there not some Bodies (*Pyroph.*) that have insipid Salts? How do these affect the Senses?

Pyroph. No (*Hydroph.*) to talk of an insipid Salt, implies no less than an ignorance of the Physical construction of Bodies, and besides also a contradiction: For therefore are things chiefly sapid, because Saline, in as much as there is no Salt without its Sapor, which if it lose, its no longer Salt (is indeed good for nothing) and therefore things are said to be insipid, when their Salts are separated by washing or otherways, or when the Principles are, lockt up; so that I say what we call insipid, is such a Texture of parts, where the Saline and Sulphureous ingredients are either totally exhausted, or else interspers'd so remissly as they affect not the Sense at all: of which sort are all decayed rotten woods, Drugs, all calcineous powders of Minerals, Metals, Animals, or Vegetables; all Marcasites, Stones, Sand, &c. or lastly complicated and lock'd up, so as our Organs of Sense are not capable of reaching or being affected by them.

But mechanically to represent those different Modifications of Bodies (called vulgarly

ly Qualities) which are nothing else but properties of Bodies as they stand related to our Organs of Sense, how I mean such tastes result from such and such different modes of the Principles mutually acting in Bodies, we might illustrate from the following experiments and observations, that (for instance) upon the dissolving Silver in Spirit of Nitre, or *Aqua-fortis*, & evaporating the solution to a Crystallin form, those very Crystals become exquisitely bitter, even as Gall; although neither of the ingredients had the least perceptible taste thereof: the same acid *menstruum* poured upon another Body of a different Texture, produceth that quality we call sweet, as is evident in the Crystals of Lead made by *Aqua-fortis*, Spirit of Nitre or even the Vegetable acidity of Vinegar; which *Saccharum Saturni* (as it is called) is as sweet as any vegetable Sugar. 3. The acid Oyl of *Vitriol* poured upon another metalline Body, as upon *Mars* or *Venus*, it causeth an astringent taste, as is evident in the *vitriol* of Iron, or Copper. 4. An esurin Acid complicated with an *Alum glebe*, gives Alum and the stiptick taste thence emerging: also Oyl of *Vitriol* meeting with another Body, viz. *Quick-silver*, gives afteredulcoration, a factitious Alum, and Stiptick taste, thereto belonging. 5. An *Aqua regis* poured upon Gold,

Gold, gives a solution or Salt, whose austere taste will (as the worthy improver of Mechanical Philosophy, Mr. Boyle saith) very much resemble that of Sloes or of unripe Bul-lace.

And as bitter, sweet, astringent, stipectick, austere, so probably all other remarkable qualities are producible by Art, imitating Nature; in as much as both have the same Principles, only variously modified, to proceed upon: the same Principles being substituted to both, that what Art goeth upon the same nature *suo modo* probably useth in the productions of Bodies and their qualities Physically.

In all which aforesaid experimental observations we see the same (or analogous) acidity being determined upon different Bodies, give various *Phænomena* of tastes, according to the difference of the Sulphur inclos'd in divers Bodies it meets with: and whereas we have no better way of taking measures of Natures workings in Bodies from her own intimate and Essential Principles, than by Mechanicks, or artificial imitations thereof: Therefore by how much the nearer we approach by skillful contrivances to emulate Nature in the production of new Bodies and qualifications or properties thence resulting, the more likely

likely are those Principles (we so search forth) to be consonant to those of nature, the great matter we aim at.

For as sweetness (for instance) is made from some Acids hitting upon and concentrating with insipid Bodies, in whose Texture a peculiar Sulphur lodgeth, (as in the examples aforesaid) so likewise probably Nature useth an acid and a peculiar Sulphur (both native and feminal) as the mechanical Agents in the Physical production of the *Saccharin* juice of *Sugar-canes*: that Vegetable Sugar (as well as metalline) has its innate acidity, is evident, from the separation of an acid liquor in the distillation of Sugar, as well as an acid spirit is by the same way separable from *Metallin* or *Saturnin* Sugar; which very *acidum* as well as that of Vinegar or *Aqua-fortis* will with the insipid Body of *Lead* or *Minium*, gain a fresh sugarness or saccharin sweetness: and that it contains a Sulphur, is evident, both from the *coruscation* of Sugar (I mean Loaf, or hard) beat in a Mortar, which strikes fire at every knock of the Pestil: as also from the Oyl distillable with the acid Spirit. And what we have said of the Vegetable and Metalline Sugars, Art imitating Nature in order to the producing that property we call sweet, the same analogically may possibly, *consideratis considerandis*,

randis be-said of all the rest of those other properties or relative qualities we call Tastes.

But to say what combinations of Saline and Sulphureous parts in the various Texture of Bodies, and what proportions and adaptations thereof will be requisite for the making several sorts of Savors, to rank them in their several Classes from those peculiar contrivances of matter, which contribute to the Fabrick of Bodies, as they stand related to that Sense, is a work now *Hydraph.* too tedious to insist upon: For it would require a diligent scrutiny into the different figuration of Salts, and that not singly into the forms the variety of Salts naturally shoot into, but as those stand intangled with Sulphureous parts, and those again involv'd in the Texture of other combining Particles, which much alter their former solitary figures, and thereby produce varieties of Savors: concerning which we shall touch in our *Halolog. Chym.* Nor shall we here further discourse of those morbid disaffections or preposterous prevarications of this Sense by the irregularities of the Organs thereof from those alterations of the Juices and Solids of our Bodies, which we call Diseases: but shall leave them to further inspection.

SECT.

SECT. XVI.

Hydroph. S Eeing we have discours'd of Sa-
pours, lastly what think you
(*Pyroph.*) of Odours? Is not Odour a Qua-
lity of a mixt Body, arising from a dry Sa-
pidness contempered with a moisture,
brought forth by Heat?

Pyroph. That Odour should be a Quality,
(*Hydroph.*) I as much deny as I have done
Sapour, neither do I see any grounds, why it
should be suppos'd to arise from any dry sa-
pidness, or any contemperature thereof,
with a proper moisture from Heat: For first
having (and I think evidently enough) de-
monstrated the *non* existency of Concretes
from the *quaternary* of Elements; it will
therefore naturally follow, that *secondary* af-
fections of Bodies, in order to their relation
to our Sences, are to be solv'd by some other
more rational Hypothesis, and that is by ascri-
bing it to an extension of some nimble, agil
parts, carried off by an insensible collision of
the intrinick Principles of Bodies; where the
parts are from the intestine Fermentation sub-
tiliz'd, & highly volariz'd, which bears much
upon the Energy of the Sulphur, the diffe-
rent Texture of whose *aporrhæa's* (chiefly
I
emer-

emerging from their dilated operative Sulphurs) do variously *ferire nares* smite differently upon that Organ of Sense, as to produce that great variety of Odours, we find issuing from Concrete Bodies.

That Odours chiefly depend upon the Volatization, and Fermentative extension of Sulphurs, is most-what apparent in Vegetables, where we see those are most *Aromatick*, which are most pregnant with Sulphurous Emanations, and whose Sulphurs are most subtile, and extensive, (from their intrinsic Fermentation) always upon the wing: For we see that odorous Vegetables are most fragrant at their time of flowering and seeding, during which season the Sulphurs or Oyls are most predominant, as being uppermost in the wheele of operation, and so breath forth the *effluvia* to the utmost circle of their Orbs activity: which as I said are not Qualities, but minute Particles of extensive active Bodies, set on work by the springy Ferments connatural to their seminal Principles, and wound off in the form of subtile and invisible *Apporrhoea*; whence probably proceeds the great variety of Vegetable Odours,

Also in Animals, the Odours of all their Excrements as Dung, Urine, Sweat, suppurated

purated matter of Ulcers, &c. proceed from various Sulphurs excited by different Ferments in the *Analysis* of Concretes in their Road to nourishment. So also most *fetid* Odours arise from the Sulphurs of putredinous and cadaverous Bodies, where they are taken in pieces by putrid analytical Ferments.

And as the objects, so the Organs of this sense, is next to be considered, concerning which we we shall in short say, that the different Texture thereof, is capable of rendering to us the causes of divers, and those abstruce *Phænomena*, whence we say, that there are some subtile *effluvia* which exhaling from Bodies, as the result from the Fermentation of Animal Juices, which thereby become the Object of some curiously wrought Organs of Sense, how ever acute, yet are sufficient to smite the delicately wrought Organs of other Animals, is Evident amongst other Creatures chiefly in Doggs, who excel in the curiosity of smelling beyond all comparison, who can by the great sagacity of their Organs, or from such a Texture thereof as is susceptible of the most minute impressions of the least *Effluvia*, who can I say by their bare smel discern their master, among thousands and how they will trace their steps throughout a

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whole

whole Country, and finde their own way home at a vast distance, by the same faculty or acurateness of Organs.

Yea, that even the Organs of our Senses are in some persons (through an *idiosyncrasia*) capable of arriving at a higher pitch of sensation, than is vulgarly observed, even beyond the ordinary proportion of Men, may (amongst other examples) be evinced by that strange relation, which *Joannes Leo* of *Africa*, and quoted by learned *Casaubon*, of a blinde man that was a Guide to certain Merchants travelling through the deserts of *Arabia*: *Casaub.* p. 23. The man Rode upon a Camel, led his Company not by his eyes (for he had none) but by his smel, which was so exquisite, that having been acquainted with those ways before, he could find by the sent of the very Earth, nay of the Sand, (which was reached to him at every mile) where he was, and describe the places unto them as they went along, yea told them long before (which prov'd true though not believed then) when they drew near to inhabited places.

Now how Bodies should by their extended Sulphurs or intrinsick Ferments, so differently affect the sensative Organ, as to produce all those various impressions upon our Sense, which we call Odours or smels, and

and those in so different a manner as we (for want of a method of describing them) know not whether we have all the same impressions of smells from the same Concretes: How the compofure of the fenfative Organ confifts, or laftly how the manner of the various combinations of Sulphureous *Effluvia* (flowing from Fermentative Collifions of their intestine Principles) happen to our Sences, we fhall not now, I fay, take time further to difcufs, but leave to further enquiry.

FINIS.



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